The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

RECEIVED AUG 9 1920 CHEMISTS' CLUB LIBRARY

VOL. II. JANUARY 31, 1920 No. 33

Contents

	PAGE
Editorial Notes: Our Empire Markets; Oxygen Prices; The "Sectional" Point of View	111
The Calendar	113
Synthetic Production of Fats. By a Soapworks Chemist	114
Correspondence: Colloidal Clay in Soap-Making; Wasted Fuel	115
Trade Unions for Brain Workers	115
Chemical Industry within the Empire	116
Resistance of Absorption Tower Packing to Gas Flow. By F. C. ZEISBERG	118
Function and Duties of the Public Analyst. Paper by Mr. B. G. FAGAN	119
Society of Chemical Industry: Manchester Section Annual Dinner	120
Extraction Plant and Methods. Lecture by H. J. POOLEY	121
From Week to Week	124
U.S.A. Heavy Chemical Prices	125
Iron Filings for Pharmaceutical Use. Paper by Mr. H. HINDLEY	126
References to Current Literature	127
Patent Literature	128
Market Report and Current Prices	131
Catalogues Received	133
Company News; Stocks and Shares	134
Commercial Intelligence	135

Index to Advertisers, see page iii.

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to "The Chemical Age" is 21/- per annum for the United Kingdom, and 26/- Abroad. Cheques, P.O.O.'s, and Postal Orders should be payable to Benn Brothers, Ltd.

Editorial & General Offices—8, Bouverie Street, London, E.C.4.
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (4 lines).

Our Empire Markets

THE last five years have brought all parts of the Empire into a more intimate relation than ever existed before, and it would be strange if this did not result in a marked development of inter-Imperial trade. Trade, however, is not based on sentiment, but on mutual necessity which has to be satisfied on the principle of exchange. Sentiment, it is true, helps materially by creating a favourable atmosphere and mutual confidence. Provided the conditions are approximately equal, one prefers business with friends to business with strangers. It is, therefore, to be expected that the new sense of intimacy which has been called into existence between the Mother Country and the Overseas Dominions should react upon both in favour of increased commercial intercourse, provided the essential conditions of successful trading are observed. As this issue of THE CHEMICAL AGE will be dispersed widely throughout the Empire, some of these conditions may be appropriately summarised here:—

1. Regarding the maintenance of our export trade as essential to national prosperity, we must be able, as a first condition, to "deliver the goods." The world's markets are in a hungry condition, and are ready to absorb supplies. Of all the belligerent nations, with the possible exception of the United States and Japan, we have borne the heavy strain with the least exhaustion. If the British people really make up their minds to forge ahead they can do so, but industrial strife must cease and production must be developed. There is an enormous commercial field open, and unless we can supply its needs other nations will step in, and the opportunity may pass. The basis of all our hopes of rapid recovery and expansion lies in the willingness of every citizen, whatever his position, to settle down to work and get on with his job.

2. Not only must we produce, but we must produce the right goods. It has long been a criticism of English trade methods that they have been conservative and inelastic. We must differentiate between the various markets we cater for, and take more account of their distinctive needs and fashions. Goods that suit English conditions perfectly may be ill-adapted to the markets of the Far East or of South America, and our Trade Commissioners often contrast the eager attention paid by foreign rivals to the local conditions of Overseas markets with the comparative indifference to these matters exhibited by too many British exporters. For this purpose an improved intelligence service as to Overseas market conditions needs to be encouraged, together with a keener disposition at home to adapt our products to the customer's special requirements.

3. Beyond producing the right goods and knowing the right markets, there is a further essential step. We must let the Overseas buyer know more fully, in his own language and his own currency, how we can meet his needs. It may be done through trade literature such as well-produced catalogues; through the trade press, which reaches many unknown potential customers; and through personal representation. This is another point on which our Trade Commissioners are constantly insisting. Both American and German traders have made a far larger use of press machinery in their trade propaganda than we have hitherto done. The collection of enemy firms' catalogues made during the war by the Board of Trade was an interesting study for English traders. These documents were not only attractively produced, but they were printed in two or three languages, the prices were quoted in the currencies of the different countries they were intended for, and the purpose all through was to present the goods from the special standpoint of the prospective cus-

tomer. There is a world of difference between the catalogue or the trade announcement that is regarded merely as a nuisance which has to be issued simply because others do it, and the catalogue or trade announcement which is treated as an essential piece of trade machinery, and on which thought and money are spent freely as a deliberate investment. On this point we may recall an incident which illustrates our meaning, perhaps, better than any argument. Some years ago the West End was invaded by a great American enterprise which spent enormous sums on buildings and equipment, and which organised as a new feature in English trade a costly department specially responsible for publicity. At the end of the first twelve months there was no very marked result, and we remember the head of an English West-End house chuckling genially at the apparent failure of these spacious American methods. A few years passed; the gentleman who had chuckled had himself been bought out by a combine, and the ambitious new firm had attained towering dimensions. It had planned on a big scale, and largely by the force of publicity had left its more conservative rivals behind. This new science of publicity is now being called increasingly into use, and where it is applied with intelligence, method, and persistence to the development of industry the results very rarely disappoint. But it needs to be done well, if done at all. That is the whole secret.

4. These points have no special application to chemical any more than to any other industry; they are merely general rules of good trading. As to chemistry, it is a commonplace now to say that it has a larger field than ever in every quarter of the globe. Owing to the stagnation of the war our colonies, the Near and the Far East, Russia (as soon as peace comes to that unhappy empire), South America and other parts represent immense opportunities for trade expansion. Here, as in the textile industries, we should be in a position to take raw materials and re-export them in the form of finished products, and our mercantile supremacy, now restored, qualifies us for this class of commerce as no competitor nation is qualified. Although chemical industry in our own colonies is developing it has far to go before it can hope to supply domestic wants, and in the meantime these great communities will look first to England to supply them with their needs. If workman, merchant and manufacturer co-operate they should be able widely to extend the borders of chemical industry throughout the Empire, and for the chemical engineer there should be a vast field in the installation of new plants and processes for the commercial treatment of the unlimited supplies of raw material which the Empire possesses. Our first Empire annual issue is but a modest beginning; before many years are past we shall be disappointed if it is not a familiar and valued feature in chemical industry throughout the Empire.

Oxygen Prices

THE chemical engineer is to a great extent dependent upon oxygen, more particularly in connection with the building and repair of apparatus and frequently for lead burning. It will, therefore, be a shock to many to find in the final Report of the Nitrogen Products Committee a statement which, if accurate, implies that enormous profits have been made by the manufacturers of oxygen. The reference in the Report seems to us a little indiscreet, for it deals with a complicated commercial business in a few lines, and has given rise to much misapprehension. We hold no brief for the producers of oxygen in this country; but there is a danger that definite statements of the kind may be eagerly seized upon by consumers of the gas, and the manufacturers put to needless trouble in justifying their prices.

Put briefly, the report states that the selling price of oxygen before the war ranged, to moderately large consumers, around £4 per 1,000 cubic ft., whereas figures submitted to the Committee indicate that the running cost of an average size plant are in the neighbourhood of 10d. to 1s. per 1,000 cubic ft. The statement, as it appears officially, is extremely vague, and no information is given as to the quality of oxygen referred to. Frankly, we feel that some serious miscalculation has been made, and that the figures require an explanation. We have a fairly accurate idea of what the price of oxygen is to-day and what it was in pre-war days; but as a check we have obtained the actual prices paid by a consumer in a fairly small way, who obtained no preferential treatment owing to the limited extent of his demand. He informs us that in 1914, when purchasing oxygen in lots of about 200 ft. to 400 ft. at a time, he was charged by the chief producers in this country 37s. 6d. per 1,000 cubic ft.; in 1918, 45s.; and in 1920, 50s. Where, therefore, has the Committee obtained its figure for pre-war days of £4? For even for medicinal oxygen of the highest purity the price under present inflated conditions is no more than £6 per 1,000 ft. for lots so small as 20 cubic ft.!

Again, the cost price of oxygen as given in the report (10d. to 1s. per 1,000 ft.) is somewhat misleading, for it neglects to explain that the working costs on plants of the kind are most elusive; everything depends upon the size of the installation and the nature of the power employed for driving the plant. The Committee have thought it reasonable to consider a plant having a capacity of half a million cubic feet per day, and the figures they give are, apparently, more or less hypothetical. It should be pointed out that the average standard unit in this country has a capacity of only one-tenth of the above figure, and the cost of production is, therefore, measurably greater on this account. In fact, in contrast with the Committee's figure of 10d. to 1s. for working costs, our own estimate under present conditions is more like 8s. per 1,000 cubic ft., and this figure is borne out by the manufacturers. On top of it must be placed the cost of compression, interest and depreciation on cylinders, freight and such items.

Finally, the Committee refer to the fact that when pure nitrogen is being manufactured, the residual oxygen is wasted owing to its low standard of purity. They state, moreover, that, by adopting a longer rectifying column, this oxygen may be recovered in the pure state and turned to profitable account. As to this, an engineer who has been connected with the practical manufacture of these gases since its inception in this country informed us recently that "a rectifying column as high as the Eiffel tower might be used, but

even then the desired result would not be obtained." Practically, the only method is reliquefaction of the residual gas, and this involves considerable additional expense. It seems to us idle to talk of complete recovery of both constituents of the air until the demand for oxygen and for nitrogen approximates simultaneously to 20 per cent. of the former and 80 per cent. of the latter.

The "Sectional" Point of View

AT the annual dinner of the Manchester Section of the Society of Chemical Industry, reported in this issue, some frank but entirely respectful references were made to the relation of the Council to the various Sections. We gather from the remarks of the chairman (Mr. John Allan) that a suggestion has been made to the Council by the President in favour of issuing to the various Sections a periodical report of their "Proceedings," and it seems clear that "sectional" feeling, at least in Manchester, strongly supports the suggestion. "Members of sections," Mr. Allan is reported to have said, "were apt to feel that whatever happened in the society happened in London, that the society was run from London, that anybody who did anything was in London, and that the provinces were more or less out of touch with anything that occurred." No one familiar with the strong local patriotism and independence of character exhibited by the great industrial communities of the north will be much startled by such an expression of opinion. If one wanted to secure beforehand the failure of any new scheme in Manchester, for example, nothing would be more effectual than the notion that it was being "run from London." We have known numbers of cases where confident organisers of new movements or new organisations have gone down to great centres like Manchester, thinking they had only to explain what the people there had to do, and have come back within a few hours penitently convinced that the only plan of getting these "people" to work was to let them go about it in their own way, with as little suggestion as possible of supervision from London. The spirit of local independence is nowhere stronger than in Manchester, and experience has convinced many organisations of the wisdom of taking account of it.

In applying all this to the Society of Chemical Industry it is but fair to look at the other side. The Society, of course, is not a London organisation, but a national one; the headquarters are located in London for the simple reason that they must be located somewhere, and to this extent the Society is merely following the example of other national organisations. Nor does the location of the headquarters in London imply any preferential treatment for London members as against country members. The Council's relations to the London section are exactly what they are to every other section, and it is only incidentally that a London member may hear more of what is going on than a provincial member. Any question, therefore, of conscious favour or preference as between the Sections may be dismissed from the discussion at the outset. What is it, then, that the Manchester Section, speaking for others as well as for itself, asks for? It requests a little fuller information as to what the Council of the Society is doing on its behalf. The request seems modest and reasonable. The members of the Council are clearly the servants, not the masters, of those they represent. Their constituents are naturally interested in the doings of their representatives, and like to be informed of them. On the other side, we can imagine no reason why the Council should wish to withhold such information from the bodies who elect them. There is, of course, much confidential business which cannot be publicly disclosed, and no section, we believe, would wish really confidential matter to be treated otherwise than it is at present. But general questions of public policy concerning the work of the Society and the interests of chemical industry in the wider sense are not of this class, and it is about the public, not the confidential, work of the Society that the Sections desire information. For ourselves we see no obstacle in the way of frankly meeting such a demand, nor any element of risk in it. The only point is how far it can be met at present. The Manchester suggestion is that "Proceedings" should be issued periodically. There is nothing cataclysmic in such a step; it would merely be following the practice of many similar bodies. The effect would be to increase the interest and the confidence of all the members in the work of the Society, and it would be a safeguard against the possibility of the suspicion which an over-strict secrecy often tends to excite. These results, it seems to us, would be well worth the very slight sacrifice of conservative tradition required to obtain them.

The Calendar

Feb.		
2	Royal Society of Edinburgh. 4.30.	Edinburgh.
2	Society of Chemical Industry (London Section): "The Theory and Practice of Lubrication: The Germ Process." Henry M. Wells & James E. Southcombe. 8 p.m.	Chemical Society, Burlington House, Piccadilly, London, W.1.
3	Sheffield Association of Metallurgists and Metallurgical Chemists: "Testing of Materials at High Temperatures." Professor F. C. Lea.	
3	Manchester Municipal College of Technology (Dept. of Applied Chemistry): "Filter Presses: Their Construction and Uses." T. H. Laït. 4.30 p.m.	Manchester.
4	Society of Public Analysts: Annual General Meeting. 8 p.m. Followed by Ordinary Monthly Meeting. Papers by F. S. Sinnatt and L. Slater and H. Trickett.	Chemical Society's Rooms, Burlington House, Piccadilly, London, W. 1.
4	Royal Society of Arts: "The English Language and International Trade." Alfred E. Hayes. 4.30 p.m.	Royal Society of Arts John Street, Adelphi, London, W.C.
5	Society of Dyers and Colourists (West Riding Section): "From Munitions to Dyestuffs." D. J. B. Oesch.	Leeds.
5	Royal Institution of Great Britain: "Recent Progress in Applied Optics." Professor A. E. Conrady. 3 p.m.	Royal Institution, Albemarle Street, Piccadilly, London, W.1.
6	Society of Chemical Industry (Bristol and South Wales Section): "The Bearing of Structure on the Breakdown of Metals." J. Myers. 7.30 p.m.	University College, Cathys Park, Cardiff.
6	Society of Chemical Industry (Manchester Section): Papers by Capt. F. S. Sinnatt and A. Grounds and T. Callan, J. A. R. Henderson and N. Strafford. 7 p.m.	Grand Hotel, Manchester.

The Synthetic Production of Fats

By a Soapworks Chemist

The following article describes the newer sources of fatty acids, and discusses the probability of supplementing the existing supply from such sources as the hydrocarbons from coal and petroleum. As the writer points out, however, it is primarily a matter of cost of production, and the most that can be expected of the synthetic products at present is that they might have a controlling influence on the price of the natural product.

A CONSIDERABLE amount of research work has been carried out in Germany and also in Russia and Austria during recent years with the view of discovering and developing a commercially workable process for the synthetic production of fats and fatty oils from coal and mineral oils. The shortage of fats on the Continent has been, and still is, so acute that every possible source, natural and artificial, is being exploited in order to increase supplies. The most promising line of work at present appears to be that of the Mineral Oil Works at Pardubitz. This firm has recently taken out several English patents for the production of fatty acids from paraffin.

The work of Harries and others on the synthesis of fatty acids from coal has been widely discussed in Germany, and exaggerated hopes for the manufacture of "coal margarine" and other fatty foods from mineral sources have been indulged in. But this consummation, whether devoutly to be wished or not, is not likely to be achieved at present. The process, according to Gawalowski, looks very simple: the ethylene obtained by distillation of coal is oxidised into formaldehyde; this, by condensation and hydrogenation, is converted into glycerine; the glycerine is superheated and converted into "hexa-glycerin," and is then oxidised with hydrogen peroxide into oleic or stearic acid.

Fatty Acids from Coal

The yield of ethylene from coal, however, is only about 1 per cent. by weight, and when converted into fatty acid the yield would be much less than this. In the oxidation of ethylene to formaldehyde the former must be present in great excess and heated with oxygen to 400°C. Ozone may be used instead of oxygen, but in this case formic acid is also produced. More recently methane has formed the starting point instead of ethylene, in which case the yield is slightly better. In the condensation of the formaldehyde to glycerin ethyl alcohol is first formed, and it would therefore seem more feasible to start with ethyl alcohol obtained by distillation of wood waste instead of coal. However, the whole process along these lines has proved too complicated and costly and the yields too small to be of much practical value.

More encouraging results have been obtained by using acetylene, which may be hydrolysed to acetaldehyde by using mercury salts as a catalyst. By hydrogenation the acetaldehyde is converted into ethyl alcohol, or, by oxidation, into acetic acid. But acetylene, like ethylene, is a low molecular substance, and the conclusion was reached that if a substance of high molecular weight could form the starting point the process would be greatly simplified. Such substances are obtained in the fractional distillation of mineral oils or tar oils.

Results from Petroleum

The Russian chemist, Zelinsky, has been one of the chief pioneers in the application of the Grignard reaction for the production of fatty acids from petroleum, and so long ago as 1902 he took out a German patent (No. 151,880) for the chlorination of certain petroleum fractions. The fraction 132-145° of a Russian petroleum was chlorinated, treated in ether solution with magnesium and carbon dioxide, and the resulting magnesium salt decomposed with dilute sulphuric acid. An acid $C_{10}H_{18}O_2$ was obtained which, on heating with glycerin at 250°, yielded a di-glyceride and a tri-glyceride to the extent of 60 per cent. of theoretical according to Zelinsky. In normal times, however, that is to say at pre-war prices, this could not have competed with natural fats; but it was otherwise under war conditions, and it is said that the Vereinigte Chemische Werke A.G., of Charlottenburg, were able to manufacture fat on a commercial scale by the Zelinsky process. F. Schultz in 1912-13 was, perhaps, the first to oxidise mineral oil fractions; but the percentage of fatty acid obtained was very small, the chief oxidation products being aldehydes.

Some of the best results have been obtained with the oxidation of paraffin. The Chemische Fabrik Troisdorf (Dr. Hülsberg & Seiler) have patented the following method: Air or oxygen is led into a vessel containing melted paraffin for about 50 hours at a temperature of 100-120°, oxide of mercury or previously oxidised paraffin being utilised as a catalyst. The products consisted partly of oleic acid and partly of volatile substances, but nothing definite is given in the patent as to yields of oleic or other fatty acids. A somewhat similar method is that of the A. G. für Mineralolindustrie vorm (David Fanto & Co.), of Pardubitz. This firm has been working on a large scale since 1915, a process which consists mainly in blowing air into the paraffin for 15 to 18 days at a temperature of 130 -135 (see also English patents Nos. 131,301, 131,302, 131,303, 133,027). The yield is calculated at about 60 per cent. A fatty acid $C_{11}H_{22}O_2$ of melting-point 53·7° was thus obtained, together with an iso-palmitic acid $C_{16}H_{32}O_2$ of melting-point 38·4°, and lignoceric acid $C_{24}H_{48}O_2$ of melting-point 80°.

The Ozone Process

Another oxidation process is that of Harries', who used ozone and hydrocarbons boiling between 125° and 220° obtained from Thuringian lignite tar oil. The yield was about 50 per cent. and among the fatty acids obtained were stearic, palmitic and myristic. The process is said to have been considerably improved recently, so much so as to justify the hope that it may be commercially feasible. In his paper read before the annual general meeting of the German Chemical Society at Wurzburg, Wilstätter, who has done much valuable work in connection with plant chemistry, such as chlorophyll research, strongly emphasised the need for a closer adherence to the biological processes of the plant in fat synthesis. He stated that he had developed a method for obtaining formaldehyde from ethylene with good yields.

Mixed Glycerides

It will be noted that the most recent attempts to synthesise fats have stopped at the fatty acid stage, for the subsequent operation of incorporating glycerine and producing mixed glycerides has proved extremely complicated and troublesome. Natural fats and oils are very complex; we know that they consist of mixtures of mono-, di-, and tri-glycerides; but in regard to most of them we are not even yet sure of their exact composition, and until we know this it will be obviously impossible to synthesise them. As regards one large fat-using industry, *i.e.*, soap-making, fatty acids are precisely what is needed, and the glycerine can for the most part be dispensed with, especially if Connstein and Lüdecke's process for obtaining glycerine from sugar turns out to be as satisfactory as it claims to be. In the case both of glycerine from sugar and of synthetic fatty acids it is primarily a question of prices, and the most that the artificial product can hope to do at present is to act as a stabiliser and prevent too great a rise in the price of the natural product.

Colloidal Clay in Soapmaking

To the Editor of THE CHEMICAL AGE

SIR,—We were much interested in reading Mr. F. E. Weston's article on "Colloidal Clay in Soap Manufacture," and would like to draw your attention to the fact that we are working the Schwerin patents for the electrical purification of clay. By the use of our process it is possible to obtain a degree of purity and fineness which we claim to have been previously unobtainable, and we have developed the machines and equipment successfully on a commercial scale.—Yours, &c.,

36, Victoria Street, S.W.1, January 27. THE OSMOSIS CO., LTD. (W. C. Barrett, Sec.)

To the Editor of THE CHEMICAL AGE.

SIR,—With reference to colloidal clays and soap, it may be of interest to state that in 1908, when first I was interested in colloidal clays, owing to an examination of a sample of highly colloidal clay which was physically very soap-like, I learnt, on perusal of good literature, that a clay which I identified from the description as identical with the one submitted to me, was stated to have been used in lieu of soap for some time at the hotel situated in the locality where the deposit existed.

As ordinary dirt may generally be regarded as consisting largely of clay, this application of the detergent qualities of highly colloidal clay affords another instance of the romance (and economic value) of science being employed for removing dirt.

Perhaps I may add that the composition and properties of this clay corresponded closely with that of the colloidal mineral content of Trinidad Lake asphalt, as described by Clifford Richardson, and to which in large measure is ascribed its pre-eminence for paving purposes.—Yours, &c.,

LOUIS J. RILEY.

To the Editor of THE CHEMICAL AGE

SIR,—We find ourselves intensely interested in the article on "Colloidal Clay in Soap Manufacture" in your issue of January 17. We believe that the chemistry of colloids is of comparatively new application to commercial projects, and shall be glad if you can help us with particulars of any literature there may be dealing with colloidal chemistry in general and with the application of this branch of science to clays in particular.—Yours, &c.,

Heathfield, Newton Abbot, January 26. CANDY & CO., LTD.

[Our correspondent's requirements will, no doubt, be met by E. Hatschek's book on "Colloids," while reference might also be made to the British Association's Reports on "The Application of Colloidal Chemistry," 1918-19; and also to a paragraph in last week's issue of THE CHEMICAL AGE, page 87. So far as the use of colloidal clay is concerned it would be as well to write to Catalpo, Ltd., of Bristol House, Holborn Viaduct, E.C.1, for the interesting pamphlets they have issued in connection with this subject.—ED. *C.A.*]

Wasted Fuel

To the Editor of THE CHEMICAL AGE.

SIR,—Certain processes in the chemical industries have features which, as yet, are only lightly considered, yet they have a direct bearing on the question of power generation. Boilers and furnaces have so-called "waste gas" or "waste heat" from which power may be obtained; collieries usually have large quantities of "unsaleable" coal; timber mills have accumulations of timber refuse; tanneries have spent bark; engines have exhaust steam, and so on. All these possible fuels are not, in normal times, worth consideration on account of the cheapness of coal, but they may well be considered now that fuel is scarce and expensive, and when every possible chance of reducing manufacturing costs is being developed. It should be a part of every chemist's work to suggest one or more of the numerous ways, such as the above, by which the cost of fuel for generating heat and power for various processes of manufacture may be reduced in the works in which he is employed. Many chemical and other works are so inefficient, so far as heat and power production are concerned, and so little care is taken in estimating the relative cost of different processes and carefully examining the existing processes in order to discover sources of loss and methods of improvement, that there is ample room for progress.

When we consider that in an ordinary steam engine nearly half the steam is absolutely wasted through condensation in the pipes, in the cylinder and the heat lost in the exhaust steam, it is clearly seen that some improvement is necessary.

Then again, in examining many of the heating devices so largely used in chemical works, we find that 30 to 40 per cent. of the heat is lost through inefficient combustion in the waste gases which pass out of the chimney, without any attempt being made in most cases to reduce this loss. When it is realised that this loss is often 25 per cent. of the total profit in the works, it will be seen how urgent it is to adopt some method of increasing the efficiency of the plant and endeavouring to minimise such losses. Most works chemists have the peculiar habit of only paying attention to purely routine work, and they appear to be unaware of the opportunities presented to them for using their gifts and knowledge with regard to questions of heat economy.

If some chemists would only investigate the result of mixing low-grade fuel with that of better quality coal, they would soon learn how much saving could be effected without in any way detracting from the quality of the products of the works.—Yours, &c.,

The White Building, Sheffield. January, 1920. A. B. SEARLE.

Trade Unions for Brain Workers

WE understand that on February 7 in London a conference will be held under the auspices of the Labour Party with the object of securing an alliance between the manual labour organisations and those classes of workers who regard themselves as "professional." Among the classes invited to the conference are mine managers, scientific workers and—more important of all to our readers—industrial chemists. As we pointed out in a recent issue, the prejudice of the "professional" classes of workers against a frank alliance with "labour," is gradually giving way, and we are interested to learn that our article on the subject has been followed by a substantial accession to the membership of at least one association. The subject is one of immediate interest to all working chemists, and we shall be glad to have opinions from our readers on this new movement for the organisation of brain workers on a trade union basis.

Our Newcastle correspondent states that Sir Theodore Morison, Principal of the Armstrong College, Newcastle, interviewed on the question of three professors leaving the College within a few days, pointed out that the College paid smaller salaries than any other university in the country, and that industrial concerns were offering high salaries for chemists which added to the competition. The three professors who have left are: Professor T. Franklin Sibly, professor of geology; Professor Samuel Smiles, F.R.S., professor of organic chemistry; and Professor T. Loveday, M.A., professor of philosophy.

British Cyanides Co., Ltd.

AT the extraordinary general meeting of British Cyanides Co., Ltd., the chairman said that it had been decided to issue new shares in view of the rapid growth of the company and the necessity for enlarging the plant in order to cope with the ever-increasing orders. To attain to the highest efficiency it was essential that the staff should be adequately housed and that far better accommodation should be given to the research department. At the earliest possible moment, therefore, the necessary plans for a thoroughly up-to-date office building and research laboratories had been prepared, and this work was now practically complete. In spite of rigid economy in the erection of these buildings, however, it required considerable expenditure. The company had also found it essential, in order to meet the changing requirements of the business, greatly to extend the Popes-lane factory and to alter the arrangements at Tat Bank.

With regard to raw materials, very important work was being carried out. Success would mean an immediate development on new lines for the production of raw material, and it was a very important fact that there was ample accommodation at Popes-lane factory to carry out any extensions required for this purpose. It had been decided to liquidate the boiler-makers' business of Fred. Danks, Ltd., while second-hand plant and machinery was so keenly in demand. By so doing, they would release for the manufacture of chemicals the large building in which the boiler-makers' plant was housed. The erection of a building of this type was one of the most difficult matters in present-day work, and its existence was a great asset to the company.

Chemical Industry Within the Empire

WHILE in many of our Colonies—Canada may be specially quoted as an example—there are signs of a steadily developing domestic chemical industry, favoured by rich natural resources and abundant water-power, these Colonial developments must still be regarded as in their infancy. For many years to come their chemical wants will have to be supplied from outside, and in the first instance the natural source to which they will look for supplies is the Mother Country. A glance through the lists of chemical inquiries published in our own columns during the last six months indicates something of the colonies' requirements. These, of course, are very far from exhaustive, and are only quoted now as typical of the chemical products for which extensive markets exist in the Colonies :—

AUSTRALIA.

Chemists' and Druggists' Supplies.
Sulphate of Copper.
Chemicals, Drugs, Oilmen's Stores.
Glass.
Chemicals in bulk.
General Chemicals.
Sodium Acetate.
Sulphate of Copper.
Drugs, Dyes.
Heavy Chemicals.

CANADA.

Glass Bottles.
Chemicals.
Phosphate.
Soap Dyes.
Glass.
Lithopone.
Iron Oxides.
Molybdenite and Tungsten.
Drug Specialities.
Soda Ash.
Sodium Sulphate.
Bleaching Powder.
Industrial Chemicals for Soap, Fertilisers and Paper.
Linseed Oil.
Quicksilver.
Aniline Dyes.
Plate Glass.
Dyes.

INDIA.

General Chemicals.
Refrigerating Plants.
Glass.
Soap.
Aluminium.
Druggists' Supplies.
Asbestos.
Dyes.

AFRICA.

Chemical Manures.
Soap and Oils.
Colours and Varnishes.
General Chemical Products.
Aniline Dyes.
Glassware.
Druggists' Sundries.
Tar or Tar Substitutes.

It may now be interesting to give from the other side some notes on the present position of chemical industry in some of our colonies.

Canada's Chemical Industries

Taking first the trade of Canada and Newfoundland the results of the war, it is stated, have been twofold : (1) A great increase in the capacity and volume of production of Canadian factories, and (2) a somewhat unexpected termination of war orders and subsequent efforts to turn the production of works into peace lines. The census of manufactures for the year 1915 showed that the output of Canadian factories was valued at $1,407,000,000. It is understood that the value of Canadian industrial production for the year 1917 will be shown at not less than $2,400,000,000. The production of all metals, with the exception of gold and silver, was greater in 1918 than in the previous year, and in the case of nickel, zinc, pig iron, and cobalt the production was larger than in any previous year. The refining of metals begun in previous years was materially extended. In non-metallic products there was a large and increasing output of products, such as asbestos, chromite, feldspar, fluor-spar, graphite, magnesite, pyrites, &c. Of petroleum, the production of which has been steadily decreasing for a considerable number of years, a considerably increased output was obtained in 1918.

In co-operation with the Manitoba and Saskatchewan Governments a plant is to be established in Southern Saskatchewan to test the commercial feasibility of carbonising and briquetting the Western Canadian lignites for heating in domestic furnaces. The tar fog research, initiated in 1917, has been continued, and may lead to the application to various works in Canada of a new electrical process for the recovery of by-products now lost in the destructive distillation of coal, wood, &c. Research work connected with the recovery of industrial alcohol from the sulphite liquor waste of Canadian pulp mills points to the installation of recovery plants, and the production in Canada, at decreased cost to consumers, of the alcohol needed for industrial purposes and as a substitute for motor fuel.

Ontario

In a detailed report of the Province of Ontario it is stated that manufacturers have taken advantage of the decreasing imports from the United Kingdom and other countries, and have started manufacture in lines previously imported. These include chemical products, alloys, semaphore lenses, ruby lantern globes and phonograph records. "After the war," the Trade Commissioner states, "many works will be erected, or their products changed to a peace basis. Among them will be a new industry in this area, namely, dyes. This will be at Windsor, where a range of common dyes will be produced in works formerly engaged in war productions."

Six of the seven national works erected by the Imperial Munitions Board, in connection with war orders, were established in Ontario. Their names and the value of their production up to October 31, 1918, are as follows : British Acetones, $3,300,000 ; British Chemical, $14,660,000 ; British Cordite, $11,150,000 ; British Explosives, $9,700,000 ; British Forgings, $15,135,000 ; Canadian Aeroplanes, $13,020,000.

With regard to the chemical industry, the town and district of Niagara Falls is becoming one of the most important centres of chemical industry in Canada. The manufacture of these lines, however, is not confined to that part of Ontario. The activities of the Imperial Munitions Board, Ottawa, have in large measure been responsible for the development. The Board controlled during the war several modern explosives works, and have obtained therefrom a greatly increased production of mineral acids and similar products. Two new processes for the manufacture of acetone, and a new one for the manufacture of glacial acetic acid, have been put into operation. There has been considerable expansion in the production of glycerine, ethyl alcohol, toluol and benzol. Methyl ethyl ketone and butyl alcohol are being manufactured upon a large scale. Development has also occurred in the production of crude magnesite, calcined ferruginous magnesite, chrome, china clay, ochre, Epsom salts and alums. There is a prospect that potash from the recovered fumes of cement works will be obtained. A company in this area are now manufacturing ammonium chloride, which has not previously been produced in Canada. Supplies formerly were imported from the United States. The article which this company are manufacturing is white granular ammonium chloride, otherwise known as salammoniac. At present the company's capacity is limited, and they are able to take care only of the requirements of the Canadian trade. They are also manufacturers of the following products, not hitherto produced in Canada : Acetyl salicylic (aspirin), phenacetine, permanganate of potash, paramidophenol, of base and hydrochloride. At the same time, it is expected that the United Kingdom will continue to do a good business in this market, providing that proper steps are taken to meet foreign competition.

With regard to paints and varnishes, an Ontario paint manufacturer states : "The Canadian paint manufacturers are after export trade more than ever, and we hope to retain most of the new markets after the war, when normal conditions return. Indeed, we are just reaching a position where we can compete with any country in the world. We have our flax for making the oil ; we are getting an early start on our zinc mines and our oxide mines, and there is only turpentine on which we are dependent for outside supply. And to offset this, in British Dominions, we have the advantage of using the imperial measure instead of the wine quart."

New Brunswick

Mr. W. E. Anderson, in reviewing trade conditions in New Brunswick, states that as the result of greater and more scientific methods of development of natural resources the province has enjoyed uninterrupted prosperity during that period.

The antimony ore deposits at Lake George, New Brunswick, are declared by metallurgists to be the only antimony deposits in Canada or the United States of sufficient magnitude or extent to maintain a smelting plant. These deposits have been partially developed by several local companies during the past few years, who eventually dropped out owing to lack of sufficient capital. The property has now been taken over by the North American Antimony Co., Ltd., a company

organised especially to develop this property, and said to consist entirely of New York capital.

Quebec

In his report on the general trade of the Province, Mr. G. B. Ramsey, Imperial Trade correspondent at Quebec, states that outside the city, in what may be described as the Quebec district, a wonderful development is taking place in connection with hydro-electric power. The Government of the Province, some years ago, adopted a policy of conservation and development of the water powers, their principal project being the La Loutre Dam on the Ste. Maurice River, which provides a storage reservoir covering 360 square miles, the largest reservoir in the world. With this as a guarantee of ample supply of water througout the year, a number of manufacturing plants have been established at various points on the Ste. Maurice River, and electric power developed to the extent of over 200,000 H.P. at Shawinigan Falls, 130,000 H.P. at Grand Mere, 100,000 H.P. at La Tuque, 100,000 H.P. at Three Rivers, with a possible development at various points to total 830,000 H.P. in all. The power at the various centres is now used for the production at Shawinigan Falls of dry ground pulp, sulphide pulp, calcium carbide, acetone, glacial and acetic acid, magnesium, amorphous carbon electrodes, aluminium ware, ferro alloys, axoelite.

There is no doubt that with the practically unlimited supply of power available for the development in this province, the manufacture of chemicals and other similar products should receive the attention of capitalists, now that the strain of the war has been removed. This field is now being worked, and to a considerable extent controlled by United States' interests, but United Kingdom manufacturers of mill machinery and electrical plant would, in every probability, find it possible to secure quite profitable orders in these lines if they are prepared to compete for them.

Africa's Chemical Industries

In his report on the chemical trade of South Africa Mr. J. L. Wilson-Goode, Trade Commissioner at Cape Town, states that the production of chemicals increased in value from £119,000 in the year 1911, to £171,040 in 1915-16, and to £234,494 in 1916-17. The chief chemicals produced in the Union are: Acids (sulphuric, nitric, hydrochloric, carbonic), alcohol, ammonia, argol, arsenic, bi-sulphate of soda, bleaching powder, chloride of lime, disinfectants, Epsom and glauber salts, glycerine, saccharine, sodas, starch and starch flour, nitrate of lead.

A gun cotton explosive, manufactured in Natal, which is known as "Sengite," is a production to which considerable attention has been devoted. It is possible that this article will become a permanent explosive, but the permanency or otherwise depends on future relative prices of glycerine and cotton. At any rate, during the period of the war, it can claim to have lessened the demand for glycerine and to have provided against the possibilities of a serious shortage of that article.

The present demand for cement in the Union is in excess of the local supply, but the ability to produce greater quantities is receiving considerable attention. The demand for fertilisers is increasing, but in spite of considerable deposits of phosphatic rock at Saldanha Bay, the progress in this direction has not been very rapid, owing to the difficulty of converting the insoluble iron and alumina phosphate into a form available for fertilising purposes. No doubt fertilisers will be manufactured to a much larger extent in the near future, but the importation of a considerable quantity of ingredients will, Mr. Wilson-Goode states, be necessary for some time to come.

Among the new industries which have been established are those which concern the production of calcium carbide, chloride of lime, alcohol motor fuel, glue and size, dips and disinfectants, glass bottles, sulphate of ammonia, paints and distempers from local materials, antimony smelting, arsenic and asbestos.

During recent years, and more especially during the war, when the demand for South African produce increased both in South Africa and elsewhere, the tax upon the then existing plant for refrigerating purposes far exceeded expectations, and with the greater ability of South Africa to supply other countries with foodstuffs of every description, including frozen meat, fruit, butter, &c., a demand for additional refrigerating machinery will be made. The existing plant, Mr. Wilson-Goode states, is totally inadequate to deal with the volume of traffic which passes through the cold storage. The possibilities of South Africa as an exporting country for produce is becoming increasingly manifest and cold storage schemes by several municipalities were suspended during the war solely as a consequence of the shortage of material for constructional purposes and of shipping space for the importation of the various commodities required in connection therewith. Manufacturers of this class of machinery will be well advised to take the earliest opportunity of studying the requirements of this market and of endeavouring to ascertain the extent of the probable future demand.

The imports of drugs and chemicals from the United Kingdom are far in excess of those obtained from any other country, and are approximately four-fifths of the total imports into South Africa. Before the war the importations from Germany were on a very large scale, being approximately three-fifths of the quantity imported from the United Kingdom. The United States of America had a small share of the trade, which she maintained during the period of hostilities, but, having regard to the advance of prices, it is probable that the importation from the United States has not increased to any appreciable extent. Canada, Japan and Australia have entered the market, and in some lines their position will probably be retained.

The value of the imports of perfumery in 1918 was £162,466, of which the United Kingdom contributed £68,014 and America £68,542. The imports from France were valued at £23,100. Values have been considerably increased, and it is therefore not unlikely that the quantity imported shows a reduction as compared with pre-war importations.

During the last two years supplies of paints, colours and varnishes from the United Kingdom, which were on a large scale before the war, and reached a record figure in 1916, have been reduced, and America and Canada have taken the opportunity of supplying paints, varnishes and leads, but, with the exception of American paints and leads, this competition is only regarded as temporary, the quality of the importation from these countries being inferior to the British articles and the packages of awkward dimensions. It is believed, therefore, that this trade will revert to the United Kingdom.

Australia's Chemical Industry

An interesting account of the industry of Australia at the time of the outbreak of war in 1914 is given by Mr. S. W. B. McGregor, Senior Trade Commissioner in Australia, in his report for the year 1918. Prior to the declaration of war, Mr. McGregor states, practically the whole of the base metal production in Australia had been sold to representatives of the German metal organisation. The outbreak of hostilities threw the industry into chaos, and steps were immediately taken to cancel existing agreements, and to establish the industry on a sound and permanent foundation, consistent with British interests.

The following legislative and administrative acts may be cited: (1) Cancellation of all mineral and metal contracts with enemy companies and firms; (2) dissolution of the Lead Convention controlled by Germans, which determined the price to consumer and producer of all Australian lead; (3) dissolution of the Zinc Combine, a purely German combine which controlled the world's spelter market, determining price, output, and manipulating the market as it pleased in the interests of Germany; (4) elimination of the German interests in the copper industry in Australia; (5) elimination of all enemy agencies controlling tin, molybdenite, wolfram, and other metals.

The policy of the Government is to have all metallic ores, as far as possible, treated within the Commonwealth, so that the resultant metals can be marketed in a refined state.

The Commonwealth Government have entered into an agreement with the Imperial Government for the acquisition of all wolfram, molybdenite, &c., produced in Australia. Under this agreement practically the whole of these minerals produced in Australia have, during the war, been acquired for the Imperial Government, the prices fixed from January 1, 1918, being: Wolfram and scheelite, 65 per cent., WO_3, 52s. 6d. per unit at producing; molybdenite, 85 per cent., MoS_2, 100s. per unit at producing centres.

Property Belonging to German Subjects

Now that the Treaty of Peace with Germany has come into force the Board of Trade again draw attention to the Order in Council under the Peace Treaty with Germany, under which all the property, rights and interests which are situate anywhere within the British Empire belonging to German nationals at the date when the Treaty came into force, irrespective of where the owner or owners may be resident, are charged for the purpose of securing the claims made by British nationals with regard to their property in Germany and debts owing to them by German nationals. The charge does not extend to any property which may have been acquired under the Board of Trade General Licence dated July 12 last, authorising the resumption of trade with Germany. The Order provides that no person shall transfer or deal in any way with any property subject to the charge without the consent of the Custodian, and every person who owns or controls any such property must communicate the fact to the Custodian within three months, unless particulars have already been furnished to him in accordance with the Trading with the Enemy Acts. If any person is asked to pay any money or deal in any way with property which he has reason to suspect is subject to the charge, he must immediately report the matter to the Custodian and comply with his directions. Any person who fails to comply with the provisions of the Order is liable to penalties. The authority already given to bankers to allow, without licence, German subjects resident in this country to withdraw from their balances sums not exceeding £20 in any one month remains in force.

Resistance of Absorption Tower Packing to Gas Flow

By Fred C. Zeisberg

In the following abstract of a Paper contributed to a recent meeting of the American Institute of Chemical Engineers, Mr. F. C. Zeisberg describes the results of tests of various types of tower packing undertaken by the Du Pont Company

THE past few years have seen an enormous increase in the manufacture of various types of tower packing, and several patents have been taken out on designs developed by various inventors and manufacturers of chemical pottery. Acid manufacturers have been quick to recognise the advantages possessed by these manufactured packings, and have largely replaced the pumice, quartz or coke formerly used, with rings, blocks, and other shapes. While an improvement in absorption has nearly always accompanied the adoption of one of these modern packing materials, no numerical method of expressing this advantage has been available except the figures on surface and free space, quoted by the manufacturer of the packing, and these are frequently erroneous.

For this reason the E. I. du Pont de Nemours & Co. undertook a study of various types of tower packing, with the purpose of checking up definitely the surface and free space figures not only of the artificial packings, but also of quartz and coke, and, more important still, to investigate the resistance to gas flow offered by the various types of packing in common use. In large absorption systems the resistance is an important consideration, since if improperly designed, the system will require excessive pressures to bring about the necessary gas flow. It was hoped that the data obtained would stimulate packing manufacturers to produce newer and still better types of packing.

Figures for the surface of the packing materials were calculated from measurements, and are expressed as "square feet per cubic foot." Since many of the British journals express this figure as "square yards per cubic yard" and the French and German journals as "square metres per cubic metre," it may be desirable to point out here that all of these values are of a different magnitude. One square foot per cubic foot is equivalent to 3 square yards per cubic yard, or 3·28 square metres per cubic meter. With quartz and coke, of course, the measurements are approximate only, and consequently surface figures for these materials do not possess the accuracy of those for the manufactured packings. It might be well, also, to point out that in the case of the manufactured corrugated packings the assumption was made that the corrugations did not add anything to the surface, which is not strictly true.

Frictional Resistance to Gas Flow

The free space of a packing is the intersticial space. It is the space through which the gas must pass and is expressed as a percentage. Thus, a free space of 50 per cent. means that in 100 cubic ft. of packing material 50 cubic ft. of gas passages exist. The free space herein reported was obtained by taking into consideration the number of pieces of packing required to fill a known volume, together with the average weight per piece and the apparent specific gravity of the packing material, or by actually weighing the amount of packing material whose apparent specific gravity was known which was required to fill a known volume. The free space naturally varies with the type of packing and with the manner of disposing it in the tower.

The resistance offered by a tower packing to gas flow is, of course, dependent upon both the free space and the surface exposed, but just what effect each might have it is impossible to predict. For this reason air was actually blown through a variety of packings under various conditions and the resistance was actually measured.

Experimental equipment consisted of a Wilbraham Green positive-pressure blower connected with a series of chemical ware absorption towers 30 in. in diameter and approximately 15 ft. high, the air passed into the bottom of each tower in succession, being carried from the top of one tower to the bottom of the tower following by an 8-in. pipe. A carefully measured height of the packing to be tested was supported on a checkered brick pier in the bottom of the tower. The resistance offered by this pier to an air flow much larger than is ever likely to be met in practice was actually determined to be negligible.

Derivation of Constants

Assuming that the general law of the flow of fluids holds in this case (this was experimentally demonstrated to be true), the frictional resistance is proportional to the square of the velocity of flow. This resistance may be expressed as the pressure necessary to produce the given flow.

Table I.—Characteristics of Various Tower Packings

Packing.	$\times 10^{-7}$									Per cent. free space.	Surface sq. ft. per cu.ft.	Weight lb. per cu.ft.	No. units per cu.ft.
	f_{dy}	f_{dw}	f_{dc}	f_{sy}	f_{sw}	f_{sc}	f_{py}	f_{pw}	f_{pc}				
Quartz, 6 in.	58	60	60	...	...	...	...	...	...	44	6·3	89	...
Quartz, 3 in.	101	110	139	...	...	...	...	...	...	46	12·7	86	...
Quartz, 2 in.	384	396	433	...	...	...	...	...	...	46	18·7	88	...
Quartz, ½ in. to 1 in.	672	865	1095	...	...	...	...	...	...	47	50·3	88	...
Coke, 3 in.	76	81	94	...	...	...	...	...	...	58	12·7	29	...
Coke, ½ in. to 1½ in.	289	380*	...	...	...	...	...	...	...	...	...	...	...
4 in. by 3 in. smooth diaphragm rings	51	56	63	25	34	38	...	32	34	64†	20·0	50	27
										51‡	27·0	66	36
										51§	27·0	66	36
3 in. by 3 in. corrugated diaphragm rings	51	56	63	31	42	58	26	28	28	65†	24·0	48	53
										57‡	30·0	61	67
										55§	31·0	63	70
3 in. by 3 in. corrugated spiral rings	45	54	63	54	54	61	...	...	...	72†	22·0	40	48
										64‡	29·0	53	63
6 in. by 6 in. corrugated spiral rings	...	...	...	38	47	50	24	3	35	58‡	15·0	53	8
										58§	15·0	53	8
6 in. corrugated Hechenbleikner blocks	16	36	36	35	38	38	26	...	28	72†	10·7	39	4·2
										62‡	14·3	52	5·6
										62§	14·3	52	5·6
1 in. Raschig rings	345	345	345	...	...	...	...	...	...	73	58·0	40	1350·0
Tile on edge, unstaggered	...	...	...	...	...	...	31	31	43	59	10·5	62	16·0
Tile on edge, staggered	...	...	...	...	...	...	18	24	31	75	6·4	35	9·5
Tile on edge, staggered	...	...	...	...	...	...	31	33	35	55	11·6	68	17·5
Tile on edge, staggered	...	...	...	...	...	...	43	43	74	45	14·0	81	21
Tile staggered, alternate rows flat	...	...	...	...	...	...	41	48	57	49	13·2	77	20

* Wet with 92 per cent. sulphuric acid instead of water. † Dumped. ‡ Stacked. § Packed.

Let s = linear velocity in feet per minute.
p = pressure in inches of water.
k = a fractional constant.
a = area of cross-section of packing in square feet.
h = height of packing in feet.
v = volume of air passing in cubic feet per minute.

Then $p = ks^2/v$ . . . . . (1)

and $s = a$ . . . . . (2)

Therefore $p = kv^2/a^2$ . . . . . (3)

Since the resistance or the pressure varies directly as the height of the packing we may write

$$p = khv^2/a^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4)$$

However, k is a general constant, varying in value with the type of packing. We have, therefore, designated f as the frictional coefficient of 1 sq. ft. of packing 1 ft. high, and may write equation (4) as

$$p = fhv^2/a^2. \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

f, of course, differs for each style of packing, with its method of disposal in the tower and with the amount of liquid circulating in the tower. In order to make f more descriptive, subscripts have been added, as follows :—

f_d = packing dumped into tower.
f_s = packing stacked, *i.e.*, arranged regularly in layers, but with no attempt to have pieces in one layer in any way related to those in adjacent layers.
f_p = packing packed, *i.e.*, arranged regularly in layers, with the axes of pieces in adjacent layers coinciding.
f_y = packing dry.
f_w = packing wet with water, but drained as completely as possible.
f_c = packing with water circulating over it at a rate of 11 lb. per square foot cross sectional area per minute.

It is, of course, evident that we may have, for example, f_{dy} = packing dumped and dry, and that quartz or coke can give values only for f_d and not for f_p or f_s.

The frictional coefficient was then determined for various packings under various conditions, by measuring the pressure drop through a tower filled to a known height with the packing and calculating this value to the standard condition of a 1 ft. cube. These values of f, together with other characteristic data, are given in tabular form in Table I. It should be emphasised that the frictional coefficient values are not accurate to more than two significant figures, and in some cases the second figure is in some doubt.

Variation of Resistance with Packing Sizes

These figures speak for themselves ; nevertheless, a few of the more obvious facts will be pointed out. For instance it is interesting to note how rapidly the resistance to gas flow increases with decrease in size of material (*see* quartz). That this resistance is not entirely a function of the surface exposed by the packing is indicated by the fact that as the size decreases the resistance increases first less rapidly than the surface and then considerably more rapidly. Another interesting fact is the increase in resistance, with the smaller packings, due to a mere wetting of the packing. Often the difference in resistance between a dry and a wet packing is greater than the difference between a merely wet packing and the same packing with considerable water circulating over it.

Perhaps the most noticeable thing brought out by Table I. is the fact that for a given size of packing the manufactured packings give much more surface and greater free space and interpose much less resistance in the absorption system than quartz, coke or packings of that kind. Many other points will be obvious to the reader.

Problem and Solution by Use of Constants

An example of the application of the resistance constants may not be amiss. Suppose it is desired to find out what pressure will be necessary to force 250 cubic ft. of air per minute through an absorption system composed of 5 towers 2 ft. in diameter and filled 10 ft. deep with absorption material, when 3 in. quartz is used or when 3 in. spiral rings, stacked, are used, the rate of water circulation being 5 lb. per square foot cross sectional area per minute.

The cross sectional area of the packing is $\pi 2^2/4 = 3{\cdot}14$ sq. ft. The total height is $5 \times 10 = 50$ ft. For quartz f_{dy} would be about $120 \times 10^{-7} = 0.000012$, and for spiral rings about $58 \times 10^{-7} = 0.0000058$ (since the rate of circulation for f_c in Table I. was 11 lb. per square foot per minute, values are assumed about halfway between f_w and f_c).

We have seen from equation (5) that the pressure is $p = fhv^2/a^2$ or, substituting numerical values for f, h, v, d,

$$p = \frac{0.000012 \times 50 \times (250)^2}{(3{\cdot}14)^2} = \frac{0.000012 \times 50 \times 62500}{9{\cdot}88} =$$

$\frac{37{\cdot}5}{9{\cdot}88} = 3{\cdot}8$ in. water for quartz. For spiral rings the pressure would be $3{\cdot}8 \times \frac{0{\cdot}0000058}{0{\cdot}000012} = 1{\cdot}8$ in.

The Function and Duties of the Public Analyst

Paper by Mr. B. G. Fagan, B.Sc., &c.

A MEETING of the Irish Section of the Institute of Chemistry was held on Wednesday, January 28, in the Royal College of Science, Dublin. The president (Dr. Adeney) occupied the chair, and Mr. B. G. Fagan, B.Sc., F.I.C., A.R.C.Sc.I., Additional Public Analyst of Dublin, read an interesting Paper entitled " The Functions and Duties of the Public Analyst."

Mr. Fagan first dealt with the official duties of the public analyst under the Food and Drugs Act, pointing out that the analyst holds his appointment under section 10 of the Act, and in this connection he mentioned that Sir Charles Cameron (who was present at the meeting) was the third public analyst to be appointed in the United Kingdom, Dr. Letheby, of London, being the first, and Dr. Hill, of Birmingham, the second. Mr. Fagan pointed out the objects of the Act, and mentioned that whereas in former years adulteration was of a very crude character, it is to-day of a most scientific nature, and requires up-to-date methods of analysis for its detection. The procedure adopted in taking samples officially for analysis was outlined, the salient points being—

(*a*) The vendor must be informed by the officer that the sample is being purchased for the purpose of analysis by the public analyst.

(*b*) The sample must be divided into three parts (approximately equal) and sealed, the officer submitting one part to the analyst, giving one part to the vendor and keeping the third part himself. This latter part is retained by the officer pending the result of the analysis, and in the case of a prosecution, and the analyst's certificate being disputed, this third part is forwarded to the referee analysts in the Government laboratory, if so ordered by the court.

Mr. Fagan, dealing with the various articles of food which the public analyst may have submitted to him for analysis, pointed out that in the majority of cases no standards of purity or legal definitions existed, but that in these cases little difficulty arose, as the article was definitely known under a well recognised name, and was of a well-known character and quality. Of the articles for which standards are fixed, milk was the one which lent itself most to sophistication, and it constituted the largest percentage of the samples submitted to the analyst under the Act. Milk must conform to the standards set out in the " Sale of Milk Regulations," 1901, the minimum for fat being 3 per cent., and that for non-fatty solids 8·5 per cent. These standards gave a very respectable margin to the vendor, as milk of average quality contained 3·5 per cent. of fats and 8·8 per cent. of non-fatty solids. The method of calculating the added water in milk was then explained, and also the form of the certificate issued by the analyst.

The numerous articles of food which the Public Analyst is liable to have submitted to him were then mentioned, the various forms of adulteration to which they are subject, and also, in the case of milk, separated milk, cream, butter, margarine and spirits, the orders governing standards for these

In the case of drugs, it was pointed out that the requirements of the British Pharmacopœia were invariably taken as the standards of purity for the article submitted. In Ireland, besides the drugs taken officially under the Act, a large number of drugs are examined annually for the Poor Law Unions throughout the country. Outside the analyses of these samples submitted under the Act, the Public Analyst has to examine a large variety of articles for his local authority and for private individuals. These comprise waters, oils, disinfectants, soaps, tars, paints, varnishes, asphalts, &c. In addition to these, the Public Analyst is occasionally called into cases of a criminal nature, and may have to examine stains on clothing and other articles, and also human viscera for the detection of poisons.

Mr. Fagan described a few interesting cases which he had met with in the course of his practice illustrative of the duties of the Public Analyst, and he brought his interesting Paper to a close by indicating to the student element of the audience the qualifications required for the position of Public Analyst, mentioning that the Local Government Board will not sanction a person's appointment now unless he possess the Associateship or Fellowship of the Institute of Chemistry in the branch of food and drugs analysis.

A cordial vote of thanks to Mr. Fagan for his interesting address brought the meeting to a close.

Society of Chemical Industry

Annual Dinner of the Manchester Section

THE annual dinner of the Manchester Section of the Society of Chemical Industry was held at the Grand Hotel, Manchester, on Thursday, January 22. Mr. John Allan presided over a gathering of 79 guests.

"Commercial Fresh Air"

The toast of "The King" having been proposed, Mr. Allan, in his welcome to the members, expressed his regret, which he felt was shared by all present, at the unavoidable absence of the President (Mr. John Gray), who had at the last moment been called upon to attend an important Government Committee. The commencement of Mr. Gray's presidential term of office had been strikingly auspicious in that he had brought into the Council a breath of what might be termed commercial fresh air, and the introduction of commercialism in its finer sense into the methods of procedure of the Society was already bearing fruit. Internal reorganisations were taking place, and before very long even remote sections of the Society would experience their beneficial effects.

Only at the last meeting of the Council it was suggested by Mr. Gray that the sections might be so far taken into the confidence of the Council that they should be told of their proceedings. Members of sections were apt to feel that whatever happened in the Society happened in London, that the Society was run from London, that anybody who did anything was in London, and that the provinces were more or less out of touch with anything that occurred. It was hoped that in the future matters which bore upon the life of the sections, when discussed in the Council, would be immediately made known to all interested.

Speaking in a more personal sense another reason why it was to be regretted that Mr. Gray could not attend their gathering that evening was that he was one of the very few Scotsmen who had attained to the Presidency of the Society, and as he (Mr. Allan) was also one of the very few Scotsmen who had sat in the chair of the Manchester Section it was a pity they could not have foregathered that evening and told one another what fine fellows they were. (Laughter.)

Presentation to Mr. L. E. Vlies

During the course of the evening Mr. William Thomson, Vice-Chairman of the Section, presented an illuminated album to Mr. Leonard E. Vlies, who had acted as the honorary secretary both before and during the very trying period of the war. In the course of his complimentary address to the recipient, Mr. Thomson expressed the hope that Mr. Vlies would accept the album as a token of the esteem and regard of the members of the section upon his relinquishing his official position of hon. secretary. He (Mr. Thomson) could remember the first meeting of the section in 1882, nearly 40 years ago. Since then they had had four honorary secretaries. The first was Mr. Carter Bell, who held office from 1882 until 1903, 21 years; the second, Mr. J. Hübner, from 1903 until 1911, 8 years; the third, Mr. W. H. Coleman, 1911 to 1913, 2 years; then Mr. L. E. Vlies, 1913 to 1919, 6 years. The six years during which Mr. Vlies had held office were probably the most difficult imaginable for a secretary of a Society like theirs. Everyone was engaged in making munitions or doing something else to give the enemy a very bad time. The result was there was a great scarcity of papers. It fell, however, to Mr. Vlies to find papers of some kind, and by the aid of "Sewage" and other "intricate" subjects which were not barred by the Government the Section was enabled to carry on. (Laughter.) The Manchester Section began with a membership of about 200, which, after 21 years, rose to about 300, but during the years of Mr. Vlies' term of office it increased to over 600. (Cheers.)

The present honorary secretary of the Section, Mr. L. Guy Radcliffe, then read the illuminated text of the address contained in the album, this being a particularly fine example of the work done by the Manchester Municipal School of Art.

Mr. Vlies, who, on rising to return thanks, was received with an outburst of cheers, said that he was deeply moved by the kindly references which had been made to him. He believed the Manchester Section had a unique record in the fewness of its honorary secretaries, and either the Section must have been tolerably satisfied with their services or else have been afraid to try others in case they fared worse. (Laughter.) His connection with the Manchester Section began 20 years ago when the late Mr. George Davies, the alkali inspector, was in the chair, and he recalled that during those early days he found himself wallowing up to the eyes in "Sewage." During all those years he had taken a keen interest in the affairs of the Society, and he had made many friends and he hoped no enemies. When he was asked to put on the mantle of his predecessor, Mr. Coleman, his old friend Mr. Hübner had just attained the chair, and whatever use he might have been in the Section he owed it in the first place very largely to Mr. Hübner's great experience in the Society's affairs, which was generously placed at his disposal. It was Mr. Hübner who took him to London to attend his first Council meeting. He had been particularly fortunate in having during his term of office three chairmen, whose most friendly and businesslike relations had very materially helped him to discharge his duties. He wished to express his sincere thanks to his late chairmen, Mr. Julius Hübner, Mr. J. H. Hoseason and Mr. William Thomson, for their sound guidance and enthusiastic help during the terrible war period. The Section had chosen for their new chairman and hon. secretary two of his oldest friends, and he was confident that under the wise guidance of Mr. John Allan and the super-energy of Mr. Lionel Radcliffe the Manchester Section would flourish like "a green bay tree." (Cheers.)

"The Chemical Industries of the District"

Professor F. L. PYMAN, of the Manchester Municipal College of Technology, proposed the toast of "The Chemical Industries of the District," and, in doing so, said he could only suppose the reason why he had been selected for the purpose was that he was no longer connected with the chemical industry. There was, perhaps, a certain amount of difficulty in finding someone in the Society of Chemical Industry who was not directly connected with the industry, and it was an egotistic action to propose one's own health. Nevertheless, he had a great interest in chemical industries. They were of enormous importance in the development of the country, both in peace and in war. Moreover, they were essential for the proper development of the chemical schools in universities. Unless the chemical industries demanded a large number of trained chemists the chemical schools could not keep up their present high level. Throughout the country there were enormous numbers of chemists being trained. He believed at Oxford the number was 400, and at Cambridge rather more, taking the honours course. At Manchester, taking the Owens College and the Municipal College of Technology together, there were also about 400 students being trained, and similar figures were applicable to every university in the kingdom.

Dr. Levinstein

Dr. HERBERT LEVINSTEIN, in responding, said he wished to express his gratification at the fact that Professor Pyman had joined the members of the Section at one of their less serious functions. One of the results of the war had been to draw all those engaged in industrial life very much closer to the academic world than was previously the case, and though perhaps all professors had not had that extremely valuable experience which Professor Pyman possessed, yet he did not doubt that in the case of many, owing to the special knowledge they had acquired in chemical factories, they had become very much better qualified to train the young students who were to reinforce chemical industries in future. The great number of young students who were now attending the chemical schools of the universities was a fact well worth noting. He understood that at Oxford they were working in double shifts—he did not know whether there was any union to take cognisance of the fact. (Laughter.) But it was a perfectly solemn and sober fact that until academic leaders distinguished themselves in industry there was nothing like the same rush of students to the chemical schools of the universities.

The chemical industry which he represented—he presumed he was speaking on behalf of the organic section—was almost a new discovery. It was a sort of Brontosaurus. They had suddenly become big in the public eye. Formerly people had only a very incomplete knowledge of the value to the country of organic chemical industries. We went to war without the slightest idea we should have to provide all sorts of things for the use of our soldiers in the field, for their clothing and for protection and offensive purposes, which could only be furnished by calling in the aid of chemical science. There was not the slightest doubt that the war would have finished very much sooner had the chemical industries of the country been in the same position in 1914 as they were to-day; and if there should be another war, which Heaven forbid! the chemical industry, among others, had reached such a pitch of development as would cause any aggressive nation to think long and seriously of the consequences of the step they were taking. The developments in methods of warfare which were reached towards the close af the Great War were perhaps, the greatest guarantee of peace we could have.

Dr. Armstrong

Dr. ARMSTRONG, who also responded to the toast, said he felt it a great honour to be permitted to speak after Dr. Levinstein. Those who had any appreciation of history values, and who looked back upon the development of the chemical trade in Manchester, instinctively recalled the very great name of Ivan Levinstein. In, now, almost far-distant days, although perhaps in years it was not so long ago, Ivan Levinstein was the great pioneer of the British organic chemical industry. He fought almost single-handed against every form of competition in order to maintain the British dyestuff industry inviolate against the encroachments of the foreigner. He succeeded. Although the verdict may have appeared at the time that he was submerged by competition, yet there was sufficient left as a nucleus round which during the war and since the war the nation had been able to rally. The country owed a great tribute to his memory and to the organisation he had built up, because without that nucleus we could not have got going as soon as we did. Possibly no British industry had been more in the limelight during the past few years than their own. There was much that they had had to learn and there was much that they had learned;

nevertheless he was one of those who had always maintained that their position was far from being as bad as it was depicted. Like Dr. Levinstein, and many others who were present, he could claim to have an inside knowledge of chemical industries and of what they had done. He was proud and should always be proud of what had been achieved, in face of almost superhuman difficulties.

The chemical industry was an exceptionally difficult one. Success demanded an extraordinary combination of factors. There was, first of all, the fact that one could not enter the industry blindfold, as it were, armed with a bit of capital and a little courage, and succeed. Upon the organic side particularly one could only succeed after an immense amount of research, and to do research work one had to have trained men, and in order to have trained men they must be offered sufficient financial attractions. Possibly one of the deficiencies of the industry in the past had been that they had not made the attractions sufficient, and therefore the trained men were not there in sufficiently large numbers when they were wanted. One of the results of the advertisement given to chemical industries during the war had been, as Dr. Levinstein had pointed out, that men were now rushing in to be trained. They were looking to the professors to train them as they ought to be trained. Give them men who knew chemistry. He also believed that the professors had profited by the insight into factory requirements they had gained during the war, and he thought they realised now what was wanted. Without thoroughly competent men the necessary progress could not be made. Another great factor in achieving success was patience. An industry could not be built up in a day. Napoleon was credited with stating that the British were a nation of tradesmen. It was true in his time, and it was true to-day. No nation in the world possessed the financial intelligence that they did, but unfortunately that intelligence was sometimes devoted to the flotation of a company, getting its shares hoisted up to a premium on the Stock Exchange, washing one's hands of it, and leaving an indifferently paid technical staff to do the rest. He made those remarks in all seriousness, because they were absolutely true. Chemical industries could not be built up in that way. It was necessary to have large organisations and ample resources, and be prepared to risk big sums of money and to wait for results. It was very difficult to convince the public at large of those facts. Perhaps they read that a syndicate had bought, usually, the foreign rights of a wonderful invention. Up went the shares to a premium and the public thought that all was well. That was not the way to success. Great results could only be achieved by similar methods to those adopted in the case of some of the big German companies, and the Germans had advertised the facts largely—to spend heaps of money and conduct research work for years. British firms had done the same, but they had not talked quite so much about it. It was important that they should all stick together; the old jealousies, the old individualism, must be sacrificed to some extent to the commonweal. The British were a nation of individualists. It was that factor which had won us the war and which had won for the nation its present position. It was a factor which must always be taken into account and prized; but, on the other hand, we could strengthen that characteristic to a certain extent by trying to rub off our angularities and by co-operating together. To vary certain lines of Kipling, he would say:

> "It aint the individual, nor the industry as a whole,
> But the everlastin' teamwork of every bloomin' soul."

That was the attitude with which we would have to face the future if we were to maintain the key and other industries of the country in perfect security. (Applause.)

Researches at High Pressures and Temperatures

SIR CHARLES PARSONS, lecturing on "Researches at High Pressures and Temperatures" at the Royal Institution last week, renewed his proposal that for scientific purposes a shaft should be sunk 12 miles deep into the earth. The deepest single-stage shaft on the Rand is the Hercules, 4,500 ft. deep vertically and rectangular in section. The deepest shaft in the world is the Morro Velho in Brazil; its bottom is 6,400 ft. vertically below the surface, and it has been sunk, and is worked, in stages, two of which are about 1,200 ft. vertical. The deepest shaft designed on the Rand is one of the City Deep Co.'s, 7,000 ft. vertically, of circular section, 20 ft. in diameter, and to be worked in two stages of 3,500 ft. each. In countries where the atmosphere is dry the sides of the shaft are cooled by sprinkling them with water, the evaporation of which cools the rock. This effect might be augmented by artificially drying and cooling the air before passing it down the mine. With still greater depths of shaft further methods of cooling would probably be necessary. The heat might be carried upwards by means of brine circulated in a closed ring of steel pipes with a rising and descending column, or a simpler method would be to arrange for a rain of liquid air down the shaft. When Sir Charles first brought forward his suggestion in 1904, the estimate of the time required to sink a shaft 12 miles deep was 80 years; but with improved machinery and methods the records have been so much lowered that he now thinks an estimate of 30 years reasonable. The estimated cost when the proposal was first made was £5,000,000. It would now be double or treble that figure.

Extraction Plant and Methods

Manchester Lecture by H. J. Pooley

A LECTURE of considerable importance to all those interested in the solvent extraction process for the gain or removal of oils, fats, waxes, rosins, &c., was delivered at the Manchester College of Technology, on Tuesday, January 20, by Mr. H. J. Pooley (George Scott & Son (London), Ltd.)

Solvent Extraction

In outlining the subject of his lecture Mr. Pooley said that the extraction of the materials in laboratory practice was, of course, very old, and the commercial adaptation was by no means new, but it was only in recent years that the work had reached anything like popularity. It was growing daily in prominence, particularly for the extraction of vegetable oils. During the war the shortage of fat-stuffs for glycerine and food made the recovery of the last percentage of oil or fat of an importance outside the realm of plain commercial interests. This, fortunately for progress, gave a greater impulse to the process than could possibly have been attained in any other way, since it allowed time for the prejudice which had dogged the progress of extraction throughout the past fifty years to be lived down. To some extent this prejudice was justified, for most of the earlier plants employed were of Continental origin, ill-devised and worse constructed, and caused heavy loss of solvent, due to leakage and the imperfect removal of the solvent from both the extract and the residue. Very often the composition of the solvent itself was ignored and impurities or heavy residues were introduced. Now, however, there were solvents in regular industrial supply of standard boiling point, special attention having been paid to the elimination of that small but so important final fraction with its soaring boiling point. To British engineers had fallen the credit of developing apparatus staunch, well-designed, of long life, and capable of producing solvent-free extracts and meal, both suitable for edible purposes. It was even yet pedantically stated in more than one well-known work that the products of solvent extraction could not be made edible, in face of the fact that thousands of tons of oil in this country alone produced in this way, were weekly converted into margarine and every ounce of the residue into compound cattle cakes.

As a practical and thoroughly complete demonstration of what was possible in this direction, Mr. Pooley stated that he had personally taken a handful of meal from an extractor while discharging, tossed it in his hands to cool it, and taken it immediately to a horse outside the building, and the animal consumed it greedily. Having regard to the fact that the horse was the most discriminating of all beasts, there could not be a better example of the inoffensive character of the material.

The outstanding features characterising solvent extraction were (*a*) the complete extent of the extraction, (*b*) the simplicity of the process, and (*c*) the absence of many stages of manipulation.

The alternative methods of securing the oil, fat, wax, &c., were by mechanical means or by steam rendering. Both methods were incomplete in performance, and the latter frequently robbed the material of a constituent required in a subsequent manufacture, such as the loss of glue when steaming bones for fat recovery.

Results Obtained by the Extraction Process

Mr. Pooley then stated a number of results obtained by the operation of the extraction process in the case of ground nut (pea nut), copra, linseed, maize germs, olive pressings and palm kernel showing a substantial value of increased yield per ton of seed, the lowest being copra, £2. 12s. 9d., and the highest olive pressings as high as £25. In comparing these results, he said there was very little difference in the cost of extraction as compared with expression, though this statement could naturally be modified in the case of countries where coal or natural power was cheap and solvents expensive. The difference was, however, usually only small, because, as a rule, where coal was plentiful benzol was procurable at cheap rates. Some manufacturers claimed that the press was the cheaper method, while others produced figures in favour of the solvent. A further point was that when the meal was robbed of its oil it was now of very little inferior market value to the press cake, as compounders were finding substitutes of lower cost to balance the special properties of the oil as food for cattle.

The strongest case for extraction by solvent was found in dealing with materials which could not, from their nature, be consumed as food by man or beast. In this connection Mr. Pooley instanced castor, maffura and wood oil, in which cases the oil left by the press represented dead loss, while the residue was valuable in most cases as a fertiliser or manure. The oil was a most objectionable component, producing sourness in the soil. It was deleterious to the bacteria on which very much depended, and actually waterproofed the material from the action of the moisture and air, thus preventing its assimilation. Furthermore, it caused heating in store and attracted insect life.

Mr. Pooley then dealt with the practical side of his subject. He said that extraction was employed either as a purifier or as a direct producer. As an example of the first point he mentioned the extraction of cotton for the removal of minute traces of oil prepara-

tory to its manufacture into gun cotton; the extraction by ether of cellulose in the manufacture of filter papers; the extraction of rosin from gutta percha, or wax from jute, grease from wool, grease from rabbit skins in felt hat manufacture, and also the very interesting patent process of Dr. Higgins, of the Bleachers' Association, which was carried out in the "Scott" plant. This process had for its object the removal of the natural wax from cotton and linen preparatory to bleaching, and had a marked effect in the reduction of lime and soda. Mr. Pooley cited these instances as cases where the matter extracted was of less value inherently than the residue, though it was often quite interesting to mark how the by-product grew in importance.

The other and greater group comprised those bodies in which the extract was of greater importance than the residue. In this category were included oil seeds and nuts, rosin, rubber and gum-bearing trees, bones and other animal and fish residues, trade residues, such as oil refiners, Fuller's earth or charcoal or the wax-refiners' bleaching medium, sewage, sud-cake, and so on. Though these groups were quite distinct as to the object in extraction in many cases the process was identical, while in others particular precautions were necessary in regard to the treatment (at high temperature, for example) of the residues which were valuable as distinct from the reverse case, when sometimes it was permissible to take any kind of liberty.

In approaching a subject for extraction regard must be had, apart from the points already emphasised, to the structure of the mass, and this would, or should, dictate the method of extraction and the design of apparatus. Many engineers, particularly German and Austrian, had attempted to produce a universal design for all and every material. While this concentrated selling organisation it produced many a bitter experience for the user. British firms had shown themselves to be very much more catholic in their designs, and had certainly been rewarded with greater success.

Solvents

The solvents used for the purpose under review were usually highly inflammable, two exceptions being carbon tetra-chloride and trichlorethylene. This characteristic was of the highest possible value, but unfortunately both these solvents were dear, and neither was free from suspicion in the matter of dissociation of chlorine. It was, however, only fair to say of the trichlorethylene that if kept entirely free from the di-chlor body it was, so far as was known at present, perfectly safe. It was coming into more common use, with cheaper methods in the production of carbide and so acetylene, and there seemed to be a considerable future before it. Some solvents were heavier than water and some lighter, but none of them came sufficiently near in specific gravity to make any difficulty in regard to a clean separation from water. This was important, inasmuch as in most forms of extraction plant the water vapour and solvent vapour passed together through the condensers. Alcohol was, of course, an exception, being miscible with water, and consequently had to be treated in a different manner in order to avoid refractionation. Heavier than water solvents were very conveniently treated in the store tank by submerging under a layer of water, top storage tanks being used. The vapour density had a certain bearing on success, though the heavier members could be properly dealt with in the design.

The most popular solvents, petroleum spirit, benzol, and toluol, were all inflammable, but modern plant provided adequately for all danger points. At first sight, a solvent with a low boiling point, such as carbon di-sulphide, providing it had no other disadvantages, would appear to be most attractive, and certainly at the stage where it was necessary to drive off the last minute traces from the extract or the residue it made for easy and quick working, but, on the other hand, the losses were likely to be greater. Also, where it was necessary during extraction to remove the natural moisture from the material under treatment a high boiling point solvent obviously made better service. The low boiling point solvent was catered for in the "Scott" plant by the use of a vapour super-heater and the "Scott" method of employing vapour generated in an independent vessel, this being done conveniently with but slight alteration from the standard practice. A solvent with a constant boiling point was in many particulars an advantage, and pure benzol or pure toluol or a solvent such as trichlorethylene or carbon tetrachloride were being very successfully used. Petroleum spirit was undoubtedly the most popular solvent at the present time, though the lecturer thought either pure toluol or pure benzol, as far as most materials were concerned, was likely to be in great request in the future in this country. Benzol did, however, extract colouring such as resinol-tannols from certain materials and should be used with discrimination in that respect. It was possible in most instances to wash out this colouring matter with water, and as the fats were usually washed over water the objection did not weigh heavily. Nevertheless, petroleum spirit was likely to remain in favour for a considerable time to come on account of its universal occurrence. After much difficulty refiners had been persuaded to establish a solvent with a fixed first-to-last drop distilling range of 90°C. to 110°C. During the war this was raised to 100°C. to 120°C., and so far little inconvenience had resulted therefrom.

An important point to observe in regard to all solvents was the final boiling point. This might be only a matter affecting the last 3 per cent. out of 100°C., but if that 3 per cent. had a high range, as sometimes occurred in using loosely refined petroleum spirit running up, perhaps, at the end to 140°C., that last quantity would be very difficult to remove from the oil or residue. It should be borne in mind that the solvent entered the final still in proportion of 3 or 4 to 1 of the final oil, and this heavy residue was consequently at that stage multiplied three or four times.

Types of Extractors

Mr. Pooley then proceeded to give a detailed description of various types of oil extraction plants. After mentioning the "Soxhlet" laboratory fat extraction apparatus, he pointed out that most of the earlier extraction plants depended upon this principle. The originator of commercial extraction was the Swiss chemist, Deiss, who used the solvent carbon-di-sulphide, which was still a very favourite one among the Latin races, though responsible for a great many of the troubles of the glycerine refiner, especially in the North of England, where the sulphide-extracted olive oil was in much favour as a scouring soap. In recovering glycerine, sulphites and hyposulphites found their way into the crude glycerine, and were extremely difficult to remove in the subsequent distillation for the refined article. The fact that it dissolved a colouring matter from the olive residues was, perhaps, not of great importance. The "Deiss" apparatus was interesting, as it represented the first application of solvent recovery to a material which was otherwise entirely lost. Among other designs of apparatus shown was one in which the solvent was employed by immersion or percolation, steam being used entirely for the subsequent distillation, and a Continental type of extractor for material such as bones, which illustrated the simple construction of the German plants for that work, and consisted of four parts—extractor, condenser, storage tank and still. Several illustrations were also shown of the "Scott" plant for dealing with similar material, in which the vapour was generated in the lower part of the extractor, thus extracting equally through the charge, and following this by occasional liquid washes of benzine, which by condensing the vapour in the material caused a vacuum and consequently a greater penetration. The condenser was of the tubular type giving greater facilities for repairs and cleaning. In a more modern plant designed by the same firm the vapour was generated separately, and was sometimes superheated. The "Mertz" plant was probably the cheapest form of extraction plant known, but was merely a development of the "Soxhlet" apparatus. The working of this apparatus necessitated the distilling of every drop of solvent which was used, and all the time this distilling was going on the extract was also under the influence of heat, and consequently suffering severely. The condenser and storage tank were also combined, and everything had been done to economise construction, the apparatus being sold as a universal provider for all forms of extraction, and having been put to many unsuitable uses. The last of the stationary extractors described by Mr. Pooley, *i.e.*, those in which the charge was static during the whole operation, was a further example of the "Scott" apparatus, for such seeds as did not require agitation. The apparatus consisted of an extractor with accessory tubular vessel for the production of vapour which was passed through the material, and might be used alone or supplemented with liquid washes of solvent. The vapour was used finally before the steaming off stage, and thus left the product in a dry, hot condition, and at the same time rendered it porous and crisp, so that when it became necessary to use open steam, as was the case with all such plants, it did not condense in the material, and so clog it, but employed itself solely with the removal of the last traces of the very small amount of solvent left behind after the vapourising operation. The result was that the plant turned out a dry meal.

Oil Seed Extraction

Mr. Pooley then passed on to the consideration of oil seed extraction. The seed might be decorticated, or otherwise, according to the requirements of the cake or meal producer, but in either case it was first passed through the preliminary reduction rolls in the case of the larger seeds. Some of the smaller seeds and the product from these rolls then passed through what were known as "Anglo-American" rolls, which were scored or grooved to an extent varying in regard to the number of rolls so treated in each machine, and, in their depth and frequence, according to the class of seeds. There were also variations in the adjustment between the rolls, and quite considerable skill might be shown in producing the best results, on which a great deal depended in the succeeding extraction. The seed was usually lifted from the rolls into bins or hoppers.

A number of illustrations were then shown of extraction plants with one, two, four and twelve extractors, and also of modern successful methods of distillation mainly by the introduction of live steam, producing a distillation in steam of the solvent, this being a striking advance upon the pot still method, which had considerable disadvantages. An illustration was also shown of a vacuum still, which was sometimes combined with other apparatus, which enabled the work to be carried out at a low temperature and considerable rapidity. It was important with vacuum, on account of lowering the already low boiling point, to maintain the coolest possible conditions in the distillate. The one objection to vacuum in this work was in the surface evaporation which took place, even at a lower temperature, from the recovered solvent in the receiver.

Plants for the extraction of drugs by alcohol (in which the final distillation had to be carried out by dry heat in order not to weaken the alcohol by mixture with water), the treatment of animal and fish waste, bones and meat offal, were then fully explained.

Fuller's Earth Residue

Towards the conclusion of his lecture Mr. Pooley dealt with the almost equally difficult subject of Fuller's earth residue or the catalyst from the oil hardening plant. This material used in the purification of the oil when spent was usually passed through filter presses, and all the oil possible extracted by steam and pressure. It still, however, contained an amount varying from 35 to 50 per cent. of oil. It did not lend itself to percolation or to vapourising, or to any of the ordinary methods of extraction. A system had now been patented which was in very successful operation, whereby, in contrary distinction to ordinary efforts to remove the moisture, water was actually added in certain proportions, which differed with the different materials and oils, forming a curious type of emulsion. The emulsion or jelly was passed into horizontal extractors and agitated at high speed with liquid solvent, generally petroleum spirit. Although it granulated it never lost its jellied form, and strangely enough the benzine did not lose its power to take the oil out of the jelly. A series of decanting and successive washes followed. The washes were used progressively and gained consequently in strength, after which they were distilled in the usual way. The benzine was recovered from the residual jelly by free steam in the presence of water, and the resultant mud was usually run to waste, but where costs were favourable it might be dried and revivified. The process was also adaptable to the extraction of wax from charcoal in the refining of paraffin wax, and it had several other adaptations.

In conclusion, Mr. Pooley gave examples of plant for dealing with materials which must not be contaminated with steam, such as leather, kid, rabbit and other fur skins. A method of degreasing in the dry cleaning of clothes, by the French Barbe process, in which the whole work was carried out in an atmosphere of carbon dioxide, was also illustrated by photographs; also apparatus for the degreasing of piece goods in continuous form, blankets and flannels, by which grease was removed without the use of soda and soap, though it did not necessarily eliminate the necessity for soap scouring.

Owing to the insufficiency of the time at his disposal, Mr. Pooley was unable to give any examples of costs.

American Notes.

Arsenic Production

The white arsenic produced in the United States in 1918 amounted to 6,323 short tons, valued at 1,213,000 dollars. By far the greater part of the domestic white arsenic consumed in the United States in 1918 was used in preparing insecticides and weed killers, the total quantity so used in 1918 being about 2,000,000 lb., according to the United States Geological Survey Department of the Interior. Nearly 1,000,000 lb. was used in the glass industry, and a small quantity in the preparation of drugs.

Shipments of Chilean Nitrate

The last of the fleet of vessels allocated to the Chile nitrate movement has now cleared for destination, and the 10 ships may be expected to be soon available for other traffic. These vessels, with a net tonnage of 52,583 tons, have carried in the export of nitrates 80,568 tons of cargo, all passing through the Panama Canal. All of them were operated under the Shipping Board. The nitrate shipments were as follows: 75,927 tons in 14 whole cargoes from Chilean ports; 11,200 tons to Halifax, 10,970 tons to Belgian ports, 8,575 tons to La Pallice, 2,357 tons to Havre, 4,150 tons to Nantes, 8,420 tons to Dunkirk, 7,350 tons to Rotterdam, 2,875 tons to Valencia, 7,700 tons to Savannah, 7,509 tons to Wilmington, N.C., and 4,815 tons to New Orleans. In spite of exceedingly heavy shipments of California products through the Panama Canal since its opening, nitrates from South America have formed more than one-fourth of all the cargo through this waterway.

Sale of Surplus U.S.A. Chemical Stocks

The U.S. War Department are inviting informal proposals from chemical manufacturers, dealers and distributors to market its surplus stocks of manufacturing chemicals, acids and allied products on a commission basis. The successful bidder will be required to contract with the Government to handle the entire quantity of all surplus chemicals, acids and allied products incorporated in the inventory, which will be made a part of the contract. No offer to handle a portion of the available surplus or any single product included in the inventory will be considered. The following is a list of the principal products which will be embraced in the proposed contract and the approximate surplus of each: Mixed acid, 17,138,000 lb.; nitric acid, 829,000 lb.; oleum, 6,153,000 lb.; sulphuric acid, 43,880,000 lb.; acetic acid, 65,000 lb.; absorbent oils, 81,300 gallons; calcium carbide, 630,000 lb.; diphenylamine, 100,000 lb.; naphthalene flakes, 511,000 lb.; magnesia powder, 21,000 lb.; potassium chlorate, 10,500 lb.; solvent naphtha, 28,200 gallons; caustic soda, 109,000 lb.; methylacetate, 500,000 lb. miscellaneous oils, 350,000 gallons.

Contracts Open

SOAPS and OILS.—For Battersea Borough Council. Particulars can be obtained at the Town Hall, Lavender Hill. Tenders by February 17.

TAR.—For Bexhill Corporation. Particulars from Mr. G. Ball, A.M.I.C.E., borough surveyor, Town Hall, Bexhill. Tenders by February 12.

(4) CEMENT; (8) Pitch, Creosote Oil, Black Varnish and Calcium Carbide; (11) Oils, Paints, Tallow, &c.; (12) Soap, Soft Soap and soda; (15) Chloride of Lime, Chloros, Carbolic Acid Powder, Izal, &c.—For Blackburn Corporation. Particulars from Mr. A. T. Gooseman. Tenders by February 9.

CEMENT, Benzole, Oils, Tar, &c.—For Darlington Rural Council. Particulars from the Surveyor, Union Offices, Darlington. Tenders by February 21.

TAR.—For the Earby Urban District Council. Particulars from Mr. J. E. Aldersley, surveyor, Council Offices, Earby. Tenders by February 21.

TAR.—For the Middle Ward district of Lanarkshire. Particulars from the Road Surveyors, Strathaven, Hamilton, and Airdrie. Tenders by February 9.

MINERAL OIL.—For the Corporation of Trinity House, Tower Hill, E.C.3. Particulars from Trinity House. Tenders by February 9.

OIL.—For Manchester Gas Committee. Particulars from the Superintendent of the Gas Department. Tenders by February 5.

PORTLAND CEMENT, Tar, Distilled Pitch and Creosote Oil; Lime; Oils, Paints, Colours, Disinfectants and Cotton Waste.—For the Maldens and Coombe Urban District Council. Particulars from the Surveyor's Department, Council Offices, New Malden. Tenders by February 10.

Government Contracts

The following contracts were placed by the Government during December, 1919:—

MINISTRY OF MUNITIONS.

Oils: Anglo-American Oil Company, London, S.W.; F. How & Company, London, E.

INDIA OFFICE: STORES DEPARTMENT.

Galvanizer's Salt: United Alkali Company, Ltd., Liverpool.
Potassii Iodidum: Whiffen & Sons, Ltd., London, E.C.
Potassii Permanganas: British Cyanides Company, Ltd., London, E.C.
Quinine, Hydrochlor: Howard & Sons, Ilford.
Sodii Citras: Burgoyne, Burbidges & Company, Ltd., East Ham.

CROWN AGENTS FOR THE COLONIES.

Candles: Price's Company, Ltd., Battersea, S.W.
Disinfectant: Sanitas Company, Ltd., Limehouse, E.
Drugs and Chemicals: Burgoyne, Burbidges & Company, East Ham, E.
Oil: C. C. Wakefield & Company, London, E.C.
Oil, Lubricating: Vacuum Oil Company, London, S.W.
Oil, Linseed and Turpentine: Stanley, Earle & Company, Hull.

H.M. PRISON COMMISSION.

Drugs and Sundries: Baiss Brothers & Company, Ltd., London, S.E.
Soap, Yellow: Price's Patent Candle Company, London, S.W.
Soap, Carbolic: Price's Patent Candle Company, London, S.W.

New Process for Wool Grease

A COMPANY has been formed in Melbourne for the purpose of exploiting a new process for extracting grease (adeps lanæ), the base of lanoline) from wool, and for the manufacture of special neutral wool-scouring and other soaps. The principal supply of lanoline in pre-war times, it is stated, was drawn from Belgium and Germany. The method of treatment was a trade secret, and no public description is in existence, but it is known that sulphuric acid was used in the final process of refining. In the new Australian process no sulphuric or other acid is used, and the product of the process is wholly animal and pure. A small plant has already been erected and the process tested sufficiently to prove that by it adeps lanæ can be produced in commercial quantities at a very cheap cost. Some of the product has already been sold to leading wholesale druggists, who report it to be of very high quality. The company just formed has acquired the Australian manufacturing rights.

Books Received

TABLES OF REFRACTIVE INDICES. VOL. I., ESSENTIAL OILS. Compiled by R. Kanthack; edited by J. N. Goldsmith, Ph.D. Adam Hilger, Ltd., London, N.W.1. Pp. 148.

CHEMISTRY OF COAL. Chemical Monographs Series, No. VI. By John Braithwaite Robertson, M.A. B.Sc. Gurney & Jackson, London. Pp. 96. 3s. 6d. net.

THE CHEMISTRY AND TECHNOLOGY OF THE DIAZO COMPOUNDS. Second edition. By John Cannell Cain, D.Sc. Edward Arnold, London. Pp. xii.-199. 12s. 6d. net.

From Week to Week

THE TALLOW CHANDLERS' CO. have forwarded a donation of five guineas to the Royal National Lifeboat Institution.

DR. H. E. ROAF, a former lecturer on chemical physiology in the University of Liverpool, has been appointed to the Chair of Physiology in London University, tenable at the London Hospital Medical College.

THE PRICE OF SHELLAC since the war has, it is stated, advanced from £3 to £50 per cwt. This is attributed to lack of shipping facilities, as there is no scarcity of the product in India, the producing country.

MR. DAVID EVANS, chemist, of Steele & Marsh, Bath, has been elected chairman of the Bath Chamber of Commerce for the ensuing year. Among the new members elected at the annual meeting is Mr. Luther Wilson, chemist.

IT IS STATED that Mr. R. L. Frink, Lancaster, Ohio, U.S.A., who has had lifelong experience of the American glass trade and glass research, has been appointed director of research by the Council of the British Glass Research Association.

ON THURSDAY, January 22, the sale of H.M. picric acid factory at Greetland, near Halifax, was continued, when two Lancashire steel boilers fetched £1,000 each. Other prices realised were £410 and £380 respectively for Green's economisers.

BRITISH DYESTUFFS CORPORATION, LTD., Blackley, Manchester, are inviting applications for well-trained organic chemists for positions in the company's research laboratories. A thorough theoretical and practical training in organic chemistry is essential; experience of research work is an additional recommendation.

AT A MEETING of the Birmingham Gas Committee on Tuesday it was reported that Mr. E. W. Smith, chief works chemist, who has received an important appointment in London, had resigned his position. Mr. Smith is the local chairman of the Institute of Chemists, and has taken considerable interest in the work of Midland technical societies, particularly in relation to chemical engineering.

THE NATIONAL BENZOL CO., LTD., announce that owing to the increased cost of production and transport, the price of benzol has been raised as from January 26 by 4d. per gallon, that is, from 2s. 9d. to 3s. 1d. per gallon in tins in England, with an additional 1d. as at present in Scotland. There is a reduction of 1d. per gallon if purchased in 50-gallon drums.

NEWS HAS BEEN RECEIVED of the death at Montelair, U.S.A., of Mr. W. M. Chadwick, in his 70th year. Mr. Chadwick was a South Shields man and was at one time manager of the Blaydon Chemical Works. He was also connected with the Tharsis Works on the Tyne. He was responsible for many important processes in the copper industry and went to America to the Standard Oil Co. He established the refinery of the company in New Jersey.

AN OUTBREAK OF FIRE, thought to have been caused through the over-heating of the bearings of a small engine, destroyed a shed and a building 30 yards by 20 yards and two storeys high at the chemical works of L. B. Holliday & Co., Deighton, near Huddersfield, on Sunday. During the fire two explosions occurred, but, fortunately, no one was injured. The damage, which was considerable, is covered by insurance.

DR. C. R. C. LYSTER, a pioneer on X-ray investigation, particularly in relation to the treatment of cancer, died on Monday, in his sixtieth year. Through exposure to the rays in the early days of research he contracted cancer, but in spite of great suffering, insisted on pursuing his research work until a few weeks ago. For 17 years Dr. Lyster was in charge of the electric therapeutic department of the Middlesex Hospital.

SEVERAL NEW COAL DISCOVERIES have been made in Southern Chile. One of these, near La Union, is estimated to contain 40,000,000 tons, and a special railway is being built to the Rapallo Station. Another coal deposit has been found in the Department of Castro. The greater part of the coalfield is on the beach in the northern part of Castro Bay. The coal from this region is different from that in other parts of Chile, and is not unlike cannel.

DR. SAMUEL SMILES, D.Sc. (Lond.), F.R.S., has been appointed to the Daniell Chair of Chemistry, tenable at King's College, University of London, in succession to Professor A. W. Crossley. Dr. Smiles was educated at University College, London, and at the Universities of Paris and Jena. In 1907 he was appointed Assistant Professor of Chemistry at University College, London. Last year he was appointed Professor of Organic Chemistry at Armstrong College, Newcastle. Since 1913 he has been Senior Honorary Secretary to the Chemical Society.

THE FOLLOWING are the results of the January (1920) Examinations in London of the Institute of Chemistry: For the Fellowship: In the branch of metallurgical chemistry, G. B. Brook; in the branch of the chemistry of food and drugs, fertilisers and feeding stuffs, soils and water, F. F. Beach, M.A. (Oxon), B.Sc. (Lond.). For the Associateship: In the branch of organic chemistry, H. H. Barber, B.Sc. (Lond.), L. P. McHatton, A.R.C.S., and H. C. S. de Whalley; in the branch of the chemistry of food and drugs, fertilisers and feeding stuffs, soils and water, John Haycock and Miss E. E. Sparling.

MR. S. ENGLISH, assistant to Dr. Turner, head of the Glass Technology Department of Sheffield University, in a lecture at Stourbridge on the Flint Glass Trade, described a number of American glass-making machines, including the Empire machine, which could turn out 4,000 electric lamps in eight hours, and the Westlake, which could produce them at the rate of 28 per minute. With the Libby tube-drawing machine, a long, straight, continuous length of ¼-in. tube could be obtained, at 120 ft. a minute. The English way of tube drawing, the lecturer described as primitive, and the perfectly uniform bore which was wanted could not be secured by the hand method.

MR. EWART S. ANDREWS, B.Sc., member of the Council of Concrete Institution, in a lecture on "Reinforced Concrete Design," before the members of the Chesterfield sub-branch of the Association of Engineering and Shipbuilding Draughtsmen at the Grammar School, Chesterfield, explained the general principles underlying the design of reinforced concerte structures. The lecturer stated that designers who had a sound knowledge of theory of structures should not find much difficulty in applying the principle to the particular problems of reinforced concrete work, and illustrated how much time might be saved in calculations by the use of charts. An interesting discussion followed. Mr. F. S. Marsh presided.

WITH REFERENCE to the paragraph which appeared in our issue of last week relative to British dye purchases in Germany, the Board of Trade announce that the committee mentioned in the paragraph was selected by the colour-using trades and is acting on their behalf and not on behalf of the Board of Trade, and the British Government is not responsible for the finance of the purchases. The action taken is, however, with the full knowledge and approval of the Board of Trade. The quantity of dyes to which British users are entitled under the reparation clauses of the Peace Treaty will probably be substantially in excess of the 1,500 tons stated, but the purchase now being made will be in addition to whatever amount may be received under the Peace Treaty.

THE FOLLOWING AWARDS have been made by the Council of the Institution of Mining and Metallurgy: (1) Gold medal of the Institution (premier award) to Mr. H. Livingstone Sulman, M.Inst.M.M., in recognition of his contributions to metallurgical science with special reference to his work in the development of flotation and its application to the recovery of minerals. (2) "The Consolidated Gold Fields of South Africa, Ltd.," gold medal to Mr. William Henry Goodchild, M.Inst.M.M., for his papers on "The Economic Geology of the Insizwa Range" and "The Genesis of Igneous Ore Deposits." (3) "The Consolidated Gold Fields of South Africa, Ltd.," premium of 40 guineas to Dr. Edward Thomas Mellor, M.Inst.M.M., for his paper on "The Conglomerates of the Witwatersrand."

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE report successful trials of sugar beet growing on half acre plots, from imported seed, in Ayr, Wigton, Dumfries, Kircudbright and Lanarkshire. In the roots themselves an average sugar percentage of 15·15 was obtained. In juice the sugar percentage was 15·95. The yield per acre of washed roots was 14·01 tons, the sugar yield coming out at 2·13 tons per cent. Where the lifting of the crop is delayed until October or November it has been proved that the storage of sugar by the plant continues. Sugar beet grown in 1918 on the Isle of Arran was not lifted until February 3, 1919, and the percentage of sugar in the root was found to be 18·6. Deep cultivation and liberal manuring are necessary for the well-being of this crop, which, like mangolds, are injured by frost.

THE ANNUAL REPORT of the Leeds Incorporated Chamber of Commerce states that the colour-making industry has been greatly handicapped by the difficulty in obtaining supplies of aniline oil, due to the shortage of iron filings for reduction processes, due to the moulders' strike just ended. Supplies of naphthol and various intermediate products are short of requirements. The manufacture of orchil dye is handicapped by the lack of shipping facilities for the importation of orchella weed from Angola and South American ports. The chemical industry generally, the report adds, is much hampered by the neglect of the railway authorities to return empty casks and packages which makes it impossible for the producers of tanning extracts and dyes to deliver their products according to contract terms.

A VERDICT OF ACCIDENTAL DEATH was returned at the inquest on G. W. Harris (58), a stillroom assistant employed by Stafford, Allen & Sons, Ltd., manufacturing chemists, Cowper Street, City Road, London, who died on January 17, in Guy's Hospital, from pneumonia, following upon partial asphyxiation in a refrigerating chamber. Edward Pye, foreman distiller at Allen & Sons' works, said that he found the door of the refrigerator closed and Harris inside, sitting in a bowl of crystallised thymol, with his head on a shelf; he was unconscious. Witness had warned Harris not to shut the refrigerator door. The chamber was about 6 ft. square and 6 ft. high, and would be air-tight when the door was shut. Other evidence showed that at the time of the occurrence the refrigerator was out of action. The jury, in returning the verdict of accidental death, recommended the firm to put up printed instructions on or near the refrigerator door warning men never to go inside without leaving the door open.

AT A MEETING of the Society of Glass Technology at Stourbridge last week, Dr. Turner, in an address on "The Factory Inspection of Glass Ware," said that whatever articles were made in the works should be sent out only if they bore the stamp of quality which would satisfy the individual manufacturer if he had to buy the goods himself. Every article should be carefully examined in the blank stage before it was passed on for decoration. Mr. J. S. Williams-Thomas (chairman of the British Glass Manufacturers' Association) emphasised the importance of research work and technical training. The days of suspicion and jealousy had passed, and manufacturers were more inclined to help each other than ever they had been. Modern appliances were essential if the glass trade were to maintain a proper position in international trade. The members visited the local glass and fireclay works.

THE STAFF of Messrs. Reynolds & Branson, Ltd., manufacturing chemists, Leeds, were entertained to dinner at the Queen's Hotel, Leeds, on Thursday, January 22, in celebration of the centenary of the firm, which took place in 1916, but owing to the war, the celebrations could not be held before. Mr. F. W. Branson, chairman of directors, presided, and during the evening was presented with a handsome piece of silver plate by the employees. Mr. Branson, responding to the toast of the firm, referred to the growth of their business and the work they had accomplished during the war. Sixty of the staff had served with the Forces in different capacities. The firm had turned out many tons of organic and inorganic chemicals, and delicate mechanical instruments gauged to the ten-thousandth part of an inch. In addition a good deal of research work had been carried out. About 180 guests were present.

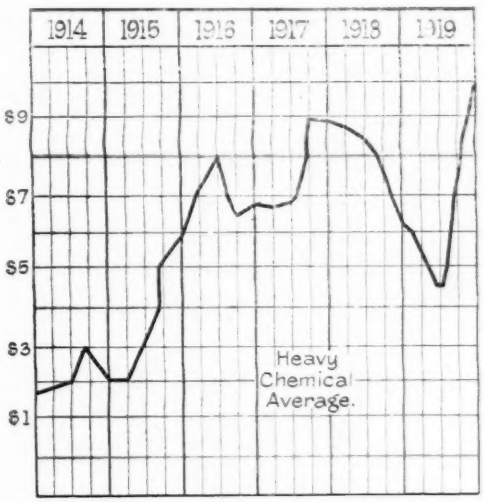
A SUM OF £500 has been given by Dr. Norman Graesser, head of the firm of R. Graesser, Ruabon, and a similar donation by Mrs. Graesser, towards a works recreation fund. Dr. Graesser's gift is to celebrate the signing of peace and that of Mrs. Graesser in memory of her late brother, Lieut. Ronald Durward. Speaking of the work accomplished by the firm during the past four years, Mr. Graesser said that during the first year of the war they supplied 50 per cent. of the war material used by the Allies for the manufacture of high explosives, and during the second year of the war 50 per cent. of the raw material used by the British Government for the manufacture of high explosives was supplied by their firm. Picric acid (lyddite) was also produced in large quantities. During July last Mr. Graesser accompanied a Board of Trade mission to the occupied territory in Germany, and inspected various chemical works in the war area, and notwithstanding the immense progress made in the chemical industry in Germany, concluded from what he saw there that, if everyone worked together in the right spirit, the chemical works at Ruabon, with the plant contained therein, could hold its own in the world's market.

THE CHILEAN NITRATE COMMITTEE have received the following telegram from the Associacion de Productores de Salitre de Chile, Valparaiso, dated January 21: Board meeting to-day resolved to sell 40,000 tons delivery April, 80,000 tons delivery May, 80,000 tons delivery June, at minimum price 13s. 9d.; these sales to be effected by inviting offers under sealed cover, to be opened in Valparaiso and London on February 5, at 11 a.m. London would immediately cable offers received to Valparaiso where all offers would be considered, preference being given to highest bids, and in case (s) of offers at equal price (s) for quantities totalling more than the amount disposable for sale for each period distribution would be made pro rata. Directorate resolved also to sell in same form, offer to be opened same date and hour, 50,000 tons monthly from July to December, minimum price 13s. 6d. for July, increasing price 2d. per month up to 14s. 4d., December. The practice of selling nitrate by tender was introduced a few weeks ago, when 100,000 tons were sold for May-June delivery at 12s. 9½d. It remains to be seen whether the tender system will produce the best results.

AN INTERESTING REPORT of the oil-drilling operations undertaken on behalf of the Government by S. Pearson & Son, Ltd., has been issued by the Petroleum Executive. Although work is being carried out on several sites in Derbyshire, North Staffordshire and the Mid-Lothian District, the only results of any importance obtained up to the present are from the Hardstoft well in Derbyshire, where oil was struck at a depth of 3,077 ft., on May 27 last, and has continued to flow steadily ever since, 1,900 barrels of 35 imperial gallons each having been obtained and put into storage. The oil occurred near the junction of the Limestone Shales and the Carboniferous Limestone, and drilling was continued 60 ft. into the latter in order to test whether the production could be increased by deeper drilling. No further increase was, however, obtained, and drilling operations were stopped on June 28. Some time ago an attempt was made to insert a pump in this well, but owing to an accident to the pump rods very little actual pumping was done, and the recovery of the broken rods and pumps has been a long and difficult task, which is not yet completed. To ascertain the actual productive capacity of the well a bailing test was begun early in December. By keeping the level of the oil at a depth of 1,000 ft. a yield of 20 barrels a day was obtained, and with the oil level at a depth of about 3,000 ft., the daily production averaged 35 barrels. As the oil horizon has not been plasted these results are regarded as excellent.

U.S.A. Heavy Chemical Prices—1914 to 1920

The accompanying diagram, reproduced from *Drug and Chemical Markets*, shows at a glance the movements of heavy chemical prices in the United States from January 1, 1914, to January 1, 1920. The diagram represents the prices of 20 of the leading heavy chemicals, including the alkalis, acids, ammonium chloride, ammonium sulphate, ammonia water, copper sulphate, carbon tetrachloride, carbon bisulphide, caustic potash, lead acetate, sodium bichromate, sodium bicarbonate, sodium prussiate, sodium silicate and sodium phosphate. Perhaps the most phenomenal advance was in bichromate of soda which occurred recently. The price went from 15c. to 45c. within eight days, but gradually receded. At the close of the year the price was about 22c. on spot material, an advance of 12c. since last summer. Offers of copper sulphate of 4½c. for export were turned down by consumers last spring. Then the price rose to 9c., but dropped again to the recent figure of 8c. Heavy buying on the part of Japanese consumers of ammonium sulphate, together with the curtailment of supplies, has caused an advance of approximately $3 per 100 in about four months.



Commenting on these price movements, our contemporary states that few producers or consumers of heavy chemicals believed at the beginning of 1919 that the average price of the leading heavy chemicals would be higher at the beginning of 1920 than at any time in the history of the chemical industry. Manufacturers and dealers of many years' experience in following the markets were completely out-guessed in their estimates of requirements for the year. The situation at the beginning of 1919 was very discouraging to the manufacturer, and the only bright spot of the market was a small foreign demand. Even this was large compared with the hand-to-mouth buying by domestic consumers. In the early part of the year production was at a standstill because of the heavy surplus that filled the warehouses of manufacturers carried over from war contracts. Consumers who were in a position to buy were sceptical, and confined their purchases to immediate requirements, believing that lower prices were sure to follow during the year. Practically the same predicament faced the large contractor, who confined his purchases to a minimum quantity. Production being at a minimum during the spring, while the industries were gradually absorbing the war surplus, June and July saw the heavy chemical field without stocks of many important commodities. Large consumers began to realise that their requirements for the rest of the year would be larger than they anticipated. About this time prices started upward, owing to the increasing demand from abroad as well as the heavier buying on the part of domestic users, and from that time heavy chemicals have been advancing steadily, and in many cases with leaps and bounds. The stringency in many items is very acute at the present time, and from appearances prices are going higher on 1920 business. The demand is heavy and supplies light.

THE NEW BELGIAN process of glass manufacture is being introduced, it is stated, at Willesden. This system claims to be the most efficient as well as the cheapest in the world, breakages being fewer than by any other process. Already 173 English workpeople are being employed, being taught by 63 Belgian experts. In time the workpeople will all be English and it is hoped to make this an important British industry.

Iron Filings for Pharmaceutical Use

Mr. H. Hindley's Paper at Edinburgh

AT a meeting of the North British Branch of the Pharmaceutical Society of Great Britain, held in Edinburgh last week, Mr. H. Hindley, Ph.C., read a Paper on "The Assay of Iron Filings for Pharmaceutical Use."

Iron in the form of fine filings, though not official in the B. P. (Mr. Hindley said), is frequently used in the manufacture of medicinal preparations containing iron, instead of nails or wire, and as it is more liable to contamination in this form it demands more careful examination. From a medicinal point of view its actual content of metallic iron is not so important as in ferrum redactum, which depends for its medicinal properties on the metallic iron it contains. It is necessary, however, that it be nearly pure, as the presence of much oxide would seriously alter the iron content of the preparation if allowance were not made. An estimation of its iron content, both free and combined, is, therefore, necessary.

Iron filings are official in the German Pharmacopœia as Ferrum Pulveratum, but the assay process therein given estimates the total iron only, whether free or in any state of oxidation. The proportion of free metallic iron may be estimated by the official B. P. method for ferrum redactum, by allowing the filings to react with copper sulphate solution, and titrating the ferrous sulphate thus formed with potassium permanganate. In using this process for ferrum redactum it has been pointed out by Peck (*Year Book of Pharmacy*, 1898, page 399) that it is difficult to secure accurate or even concordant results unless certain experimental details be adhered to. This lack of concordance is due chiefly to the incompleteness of the reaction, in varying degree, due to the formation of a protective coating of metallic copper on the iron particles, and to the massing together of the particles, preventing the reaction proceeding with sufficient rapidity to be completed in the specified time. These objections apply to filings also, with greater force if they are somewhat coarse, and if care is not taken results may be obtained which are below the truth or above, for a reason to be discussed. Peck directs that the copper sulphate solution be added cold to the iron, the solution heated in a flask with Bunsen valve for half an hour, then rapidly filtered and titrated. In assaying a number of samples of iron filings by the B. P. process another complication made itself evident, and the results obtained were not only inconcordant, but in some cases impossibly high, being several figures over 100 per cent. Using Peck's modification similar results were obtained. This was not explainable for some time, till on one occasion a smell of phosphine was noticed in the hot, unacidified solution. The odour was like that of acetylene from calcium carbide. This latter smell is really due to traces of phosphine, pure acetylene being odourless. The presence of phosphine suggests the presence or formation of hydrogen, either as occluded hydrogen or formed by galvanic action between the copper and the iron, and combining whilst nascent with the phosphorus in the iron. The latter explanation is the more probable. As phosphine, PH_3, reacts with potassium permanganate, $KMnO_4$, according to the equation:—

$$8KMnO_4+12H_2SO_4+5PH_3=4K_2SO_4+8MnSO_4+12H_2O+5H_3PO_4$$

it was considered likely that traces of phosphine (and probably some hydrocarbon) were responsible for the abnormally high results obtained. It will be seen from the above equation that

$$8KMnO_4=5PH_3=40FeO, \textit{ i.e.}, PH_3=8Fe, 35=447,$$

so that phosphine has a reducing power of about 13 times its weight of iron; consequently a little in the solution if calculated as iron would produce the high result. So little as 0·000437 gram of phosphine reduces 1 c.c. of $N/10KMnO_4$. Sulphuretted hydrogen would act similarly, but the proportion of phosphorus in iron (which may be 0·7 per cent. in cast-iron), judging from published analyses of iron, is from four to seven times that of sulphur. That the gas evolved was phosphine was proved by dissolving 5 grams iron filings in dilute sulphuric acid in a flask and passing the gas generated through a solution of potassium permanganate in another flask. The permanganate solution was then decolourised with tartaric acid and tested with excess of ammonium molybdate in nitric acid, when ample evidence of phosphate was obtained. It might be expected that if phosphine was formed it would be precipitated from the solution as copper or iron compounds. In the case of small amounts, however, and under certain conditions, such as the reducing influence of the copper-iron couple, it is possible that precipitation may not take place. It was notable that the odour of phosphine was not always perceptible, though some may have been formed, in further experiments on the sample which had previously yielded it under apparently the same conditions. In fact, odour of phosphine was not the rule. Assuming phosphine, however, to be the disturbing factor, prolonged boiling was tried to eliminate it from the solution, and this was found successful. The following process was employed:—

0·25 gram of iron filings and 1·25 gram of copper sulphate were ground together in a small mortar to thoroughly subdivide the filings, then rinsed into a narrow 4,000 c.c. glass beaker with about 60 c.c. of cold water. The contents of the beaker were then brought to the boil and kept briskly boiling till reduced to about 15 c.c., then rapidly filtered, preferably at the pump, through a Gooch crucible or through a small Buchner funnel. The time of filtration is thus reduced to a few seconds, lessening the chance of oxidation and mechanical loss. But filtration must be thorough and no trace of precipitate must be allowed to remain in the solution, for it has a strong reducing action on the permanganate. Wash with about 100 c.c. of cold water, add sulphuric acid and titrate as usual.

This treatment appears to get rid of the phosphine. Either it is volatilised as formed or it is completely precipitated at the boiling temperature by the excess of copper sulphate. Brisk boiling also aids interaction by keeping the particles from massing together. There is no fear of oxidation whilst boiling as, in the narrow beaker, the liquid is covered with an atmosphere of steam. The originators of the official process in the German Pharmacopœia may have had the effect of such impurities in mind when they devised the method, which is as follows:—

One gram of ferrum pulveratum is dissolved in about 50 c.c. of dilute sulphuric acid and made up to 100 c.c. with water. 10 c.c. of this solution is treated with ½ per cent. solution of potassium permanganate, sufficient to produce a faint pink. The solution is then decolourised by means of tartaric acid, 2 grams of potassium iodide are added. The stoppered flask is allowed to stand one hour, and the liberated iodine is then titrated with N/10 sodium thiosulphate. The iron and such impurities as phosphorus and sulphur are fully oxidised. The final oxidation products of the phosphorus and sulphur have no effect on the potassium iodide, whereas the ferric sulphate is reduced to ferrous sulphate which liberates the equivalent of iodine. The process is required to yield 97·7 per cent. of total iron. The same process is used for ferrum redactum, which is required to indicate 96·6 per cent. of total iron. It must not be forgotten, however, that a standard based on the total iron is sufficient to ensure a minimum of the free metal being present when the figure approaches 100 per cent., as in the German test. But it fails to give a measure of the free metal and is, therefore, only a check on a pre-arranged standard. Clearly filings from a cast-iron at 95 per cent. or less would be rejected by the German Pharmacopœia test, and only filings from steel or wrought-iron which indicate 98 per cent. to 99 per cent. free iron are considered suitable. Such a standard determined with the precautions indicated secures medicinal preparation with full iron content.

The work in connection with this note was carried out in the laboratory of Messrs. Evans, Sons, Lescher & Webb, Liverpool.

Soap Export During the War

MR. JUSTICE ROWLATT, in the King's Bench Division on Monday, heard an action brought by John Henry Fish, formerly living at the Grove, Palmer's Green, against E. H. Jones & Meaken, Ltd., merchants and soap dealers, of Arthur Street, E.C., to recover £114, representing the balance of an account for soap sold and delivered, and also for an account to determine the amount due to plaintiff in regard to soap transactions.

Mr. Doughty, for the plaintiff, said his client was formerly a traveller for Watson's, and in 1917, when there was a great shortage of soap, and manufacturers, to protect the home trade, cut down soap supplies for export almost to extinction, was able to purchase soap in small quantities for export. He arranged with defendants to supply them with quantities of Sunlight and Watson's Matchless Cleanser Soap, which he bought for re-sale for export at a profit because of the fancy prices paid abroad. When, about the end of 1917, Lord Leverhulme bought up Watson's Matchless Cleanser undertaking, the price of soap soared and it was agreed between the parties that the contract between them could not be carried out in its entirety at the prices fixed. It was arranged, therefore, that for any soap plaintiff bought for which he had to pay more than the contract price, defendants should reimburse him immediately, and that he should have one-third of the difference between the price they bought at and the price they sold at for export. For some months matters proceeded satisfactorily, though defendants kept plaintiff short of money and there were transport delays. Eventually defendants got into difficulties with people to whom they had sold large quantities of soap in excess of the quantity plaintiff could obtain, for which they blamed plaintiff and finally refused to pay him for two comparatively small consignments of soap he had got for them.

His Lordship remarked that these were the sort of scoundrels who had brought rationing and other things upon us, by trying to go behind the regulations in order to put money into their own pockets.

Mr. Doughty: It was, unfortunately, a way round certain precautions taken by the Government.

Mr. Schawbe, K.C., for the defendants, said the point was that plaintiff undertook to supply defendants with 250,000 cases of soap. He had not done so and had broken his contract, and defendants were counter-claiming for damage for breach of contract.

Mr. Fish, the plaintiff, in evidence, said to get the soap for export he had to approach the dealers, such as wholesale and retail grocers and oilmen, multiple shops, and others, and ask them to let him have any soap which they had over and above their requirements for the home trade.

The hearing was adjourned.

References to Current Literature

British

EDUCATION. The effects of educational effort upon industrial efficiency. F. W. Gilbertson. *Engineering*, January 23, 131. An interesting Paper given before the Educational Board of South Wales Manufacturers, Cardiff.

FUEL. Spontaneous ignition-temperatures of liquid fuels. H. Moore. Institution of Petrol. Technol., January 20 (advance proof), also *Gas World*, January 24, 79. The ignition temperatures of a number of combustible liquids, singly and in mixtures, are recorded.

PLANT. Balata belting. *India-rubber J.*, January 24, 163-164. Useful notes on the power transmission, &c., and requirements of balata belting.

VISCOSITY. Fluid motion and viscosity. W. L. Cowley. *Engineering*, January 23, 101-102. A mathematical treatment of the subject.

Colonial

METALLURGY. Notes on the S. and M. Mine and on the treatment of bismuth, tin and wolfram ores. W. E. Hitchcock and J. R. Pound. *Proc. Austral. Inst. Min. Met.*, September 30, 33-73. An account of the S. and M. Mine in Tasmania, and of the working up of the ores obtained from it.

French

ANALYSIS. New reaction for tin salts. A. Mazuir. *Ann. Chim. Analyt.*, January 15, 9. The reaction depends on the insolubility of the iodides of tin in sulphuric acid.

COKE. The principal innovations in the recovery of by-products in the manufacture of metallurgical coke. C. Berthelot. *Bull. Soc. Ind. Nord France*, October, 87-192. An account of the washing of the gas, recovery of tar, benzol, &c., and manufacture of ammonium sulphate.

STANDARDISATION. Report presented to the Société des Chimistes français by the Standardisation Committee. G. Baume. *Ann. Chim. Analyt.*, January 15, 13-20. The report contains recommendations as to standardisation of the testing of chemicals, metals, &c., and of their nomenclature.

German

ASPHALT. The origin of asphalts and coals. J. Marcusson. *Chem. Zeit.*, January 13, 43-44.

CARBIDE. Some notes on carbide manufacture. J. Baumann. *Chem. Zeit.*, January 10, 33-35. An interesting account of recent progress in calcium carbide manufacture.

CYANAMIDE. Prevention of the formation of dust by calcium cyanamide. N. Caro. *Chem. Zeit.*, January 17, 53-56. Various methods for preventing or minimising dust formation by nitrolin are discussed.

RECTIFICATION. Glass rectifying column specially suitable for rectifying liquid mixtures which are difficult to separate, and for recovering volatile solvents. W. Elsner. *Chem. Zeit.*, January 3, 11-12.

Miscellaneous

ANALYSIS. Iodometric estimation of acids. J. M. Kolthoff. *Pharm. Weekblad*, January 17, 53-68. The method has been applied to a number of inorganic and organic acids.

GLASS. Philippine raw materials for glass making. T. D. Juan and V. Elicano. *Philippine J. Sci.*, May, 1919, 465-479. The resources of suitable lime, silica and alkalis are discussed, and tests made in an experimental glass furnace are described.

METALS. Researches on the fluidity of metals and alloys. D. Saito and K. Hayashi. *Mem. Coll. Eng. Kyoto Imp. Univ.*, July, 83-100.

Japan's Alkali Industry

SINCE the outbreak of war in Europe the total amount of capital invested in the soda industry in Japan has reached yen 13,000,000, of which something like yen 10,000,000 is invested in land, machinery and buildings. The Japanese soda manufacturers received a great blow after the conclusion of the armistice, and the 15 concerns in the industry recently formed an association and asked the Government for proper protection. The soda manufacturers ask the Government: (1) That salt, which is the most important material of the soda industry, shall be supplied cheaper than that for other purposes in the future, and salt for industrial purposes to be supplied at a discount of about 30 sen per 100 kin. (2) The customs duty on soda ash to be raised by 25 per cent. ad valorem. (3) The duration of the import duty to be three years. The Government appears to be favourably inclined toward the application of the soda manufacturers, but it is believed that it is considering the possible effect on the consumers owing to the granting of protection. The total producing capacity of the Japanese soda factories is put at 45,000,000 lb. a year, as against the demand of 55,000,000 lb., showing the difference of only 10,000,000 lb. In the event protection is granted, Japan will become self-supplying.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Italy (Turin) ...	Asbestos	112
Argentine (Buenos Aires)	Cement	117
Belgium (Liége)...	Chemicals; Industrial and Pharmaceutical Products	133
Latin America (Chile)	Chemicals and Drugs; Tanning Materials, &c.	153
Smyrna	Copper and Iron Sulphates; Naphthalene, &c.	148

A Canadian company producing large quantities of sulphur dioxide (SO_2) both liquid and gas, is desirous of ascertaining the nature of the market existing for it in the United Kingdom.

A despatch has reached the Department of Overseas Trade from H.M. Commercial Secretary at Buenos Aires, stating that the Argentine Minsitry of Agriculture have under consideration the proposed distillation, on a large scale, of petroleum, which would be obtained from the Government oil fields at Comodoro Rivadavia and Plaza Huincal. It is reported that a Departmental Committee has been appointed by the Argentine Minister of Agriculture with instructions to submit a project for the construction of a distillation plant on a large scale; to report on the necessary measures to be taken for carrying out the project; and to indicate the most convenient location for the plant. Should it be decided to proceed with this project a considerable amount of plant will be required, and this advance information is given in the hope that firms interested will communicate with their representatives at Buenos Aires. In the event of British firms desiring to keep in touch with this matter, and having no representative in the Argentine, the Department is willing to assist them to get into communication with a firm who might be willing to act in Buenos Aires.

British Glass Industries

MR. C. WILLIAMSON MILNE (chairman) presided at an extraordinary general meeting of British Glass Industries, Ltd., held in London on Wednesday, for the purpose of passing a resolution to increase the capital of the company to £2,000,000.

After referring to the election of Mr. Clarence C. Hatry to the position of president, and other changes in the board and management, including the addition of Baron Henri de Rothschild, Sir Francis Towle and Mr. George E. Alexander (one of the directors of United Glass Bottle Manufacturers, Ltd.), and the appointment of Colonel T. W. Simpson as general manager, Mr. Milne spoke of the many new interests acquired by the company, and the work they hoped to accomplish, emphasising the fact that the combination built up by the company was not a trust in the ordinary sense of the word, namely, a trust established to eliminate competition with a view to raising prices. It was a great combination, a national undertaking, to re-establish the business of glass-making in this country. The main objects of the undertaking were increased production and lower prices, higher wages and better conditions for labour. Of the total sum of £2,800,000 required for the contemplated extensions, £2,100,000 would be provided by the issue of 600,000 new shares to be offered share for share at £3. 10s. to the present shareholders.

He expressed the warm thanks of the company to the Commercial Bank of London for the help they had rendered to the company from its inception and referred to their readiness to assist the development of British Industries.

Mr. Milne then moved the formal resolution "That the capital of the company be increased to £2,000,000, by the creation of £1,400,000 additional shares of £1 each, ranking for dividend and in all other respects *pari passu* with the existing shares of the company." This was seconded by Sir Francis Towle and carried unanimously.

Recent Wills

Mr. J. Toone, Bournemouth, chemist £4,484

Mr. R. C. Maclagan, M.D., F.R.C.P., F.R.S.E., of Edinburgh University, and for over 30 years chairman of A. B. Fleming & Co., Ltd., manufacturing chemists, of Edinburgh and London, left personal estate in the United Kingdom £93,261

Patent Literature

We publish each week a list of selected complete specifications accepted as and when they are actually printed and on sale. In addition, we give abstracts within a week of the specifications being obtainable. Readers can thus decide what specifications are of sufficient interest to warrant purchase, the only way of obtaining complete information. A list of International Convention specifications open to inspection before acceptance is added, and abstracts are given as soon as possible.

Abstracts of Complete Specifications

122,828. ELECTRIC FURNACES. Armour Fertilizer Works, Union Stock Yards, Chicago. Assignees of M. Shoeld, 1086, Spruce Street, Winnetka, Ill., U.S.A. International Convention date (U.S.A.), January 28, 1918.

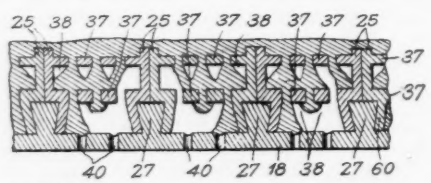
The furnace is of the type in which the material to be treated is heated in the presence of a gas to effect the desired chemical reaction, and it is specially applicable to the production of aluminium nitride. The furnace comprises a central vertical chamber lined with carbon blocks, surrounded by a ring of refractory bricks, and then by a layer of fire bricks. The whole is surrounded by brickwork and finally by a metal shell. A vertical graphite electrode is carried by a water-jacketed clamp and projects downwards into the central chamber. The other electrode is composed of a graphite ring embedded in the carbon lining of the furnace, about the middle of its height, and connected to the electric circuit by graphite conductors. The material to be treated, *e.g.*, alumina and carbon, is introduced in the form of briquettes into the top of the furnace, and passes continuously downwards, while nitrogen is passed continuously upwards through the material. The strongly heated zone is produced in the region of the ring electrode, with cooler zones above and below. No appreciable current is conducted through the cooler material above and below the heated zone, owing to its high resistance.

135,818. ELECTRO-OSMOTICALLY REMOVING LIQUIDS FROM MATERIALS, APPARATUS FOR. Elektro-Osmose Aktiengesellschaft (Graf Schwerin Gesellschaft), Lindenstrasse, 35, Berlin, S.W.68. International Convention date (Germany), October 20, 1917.

In apparatus for electro-osmotically extracting liquids in a series of flat chambers bounded by the electrodes, these electrodes are kept at a constant distance apart by distance pieces in the form of pins, frames, or the like of insulating material. If desired the distance pieces may be hollow to provide the inlet ducts for the material to be dried.

136,860. FURNACES, LINING OF. W. C. Ely, Terre Haute, Ind., U.S.A. Application date, September 9, 1918.

The object is to provide a furnace lining which will automatically assume a thickness in accordance with the degree of heat insulation desired. The application of the invention to a horizontal rotary furnace is described in detail. The furnace is preferably constructed with four flat side walls, one of which is illustrated in cross section. The outer wall plate, 18, is provided with V-shaped ribs, 27, on its inner side, to provide a dovetail locking device for the cellular metallic blocks, 25,



136,860

These blocks are slid into position on each plate, 18, and are then locked into position by the adjacent plates forming the other sides of the furnace. The metallic blocks, 25, are each provided with perforated cross plates, 37, dividing the interior of the blocks into small compartments, 38. Each of the side plates, 18, is also provided with perforations, 40, communicating with the small compartments, 38, formed by the wedge members, 60, of the metallic blocks, 25. Each metallic block is initially entirely closed on the side exposed to the internal heat of the furnace by a non-perforated wall parallel to the cross plates 37, on their inner side, but which is not shown in the illustration. When the furnace wall becomes heated by the molten slag, due to the passage of hot gases from a fire-box through the furnace, the exposed side of the metallic blocks, 25, is melted at a predetermined temperature, and the molten slag then flows into the inner compartments, 38. If the internal heat is not very intense, the slag immediately solidifies, and thus forms a thin refractory lining. The thickness of this lining will automatically vary with the internal temperature of the furnace, and with the highest temperature the spaces, 38, will be entirely filled with slag, the outer layer of which will be solidified in contact with the outer wall, 18, and will thus seal the openings, 40.

136,868. DISTILLATION OF FUEL, LOW TEMPERATURE. Merz & McLellan, 32, Victoria Street, London, S.W.1.; A. C. Michie, 77, Rosebery Crescent, Newcastle-on-Tyne; and E. G. Weeks, 1, Tynedale Avenue, Monkseaton, Northumberland. Application date, November 20, 1918.

Fuel is distilled continuously at a low temperature without external heat, by passing superheated steam or hot gases through it. The object is to avoid the binding or caking of the fuel which usually occurs in the fresh fuel added, and causes the retort to become blocked up. This is effected by previously heating the fuel by conveying it through a chamber into which steam or waste furnace gases are passed. The temperature of preheating should be sufficiently high to prevent condensation of the distillate upon it when it reaches the retort, but not so high as to cause any appreciable decomposition of the fuel.

136,870. OIL, EXTRACTION OF, BY VOLATILE SOLVENTS. A. W. MacIlwaine, "Manor House," North Ferriby, and G. F. Holdcroft, "Yeovil," North Ferriby, Yorks. Application date, December 9, 1918.

When oil is extracted from seed with benzoline or other solvent, it is found that loss of solvent and of dissolved oil occur when it is attempted to recover these from the saturated residue by treatment with steam. This loss is minimised by subjecting the residue from the extractor to a preliminary compression in a hydraulic press to remove as much of the contained liquid as possible. The material is conveyed from the extractor to the press without exposure to the atmosphere, and the compressed mass is subsequently broken up and treated with steam to remove and recover the residual solvent.

136,873. DECOLOURISING VEGETABLE CARBON, MANUFACTURE OF. C. E. Eastick, The Drive, South Woodford, Essex; and S. P. Eastick, Rossmore, Teignmouth Road, Cricklewood, London, N.W. Application date, December 16, 1918.

Any vegetable matter or carbonaceous material prepared from it, *e.g.*, wood, is ground to a fine powder, moistened with water, and then carbonised at a red or white heat in a closed vessel out of contact with air. The resulting carbon possesses a strong decolourising power. No addition of any other material before or during carbonisation is made.

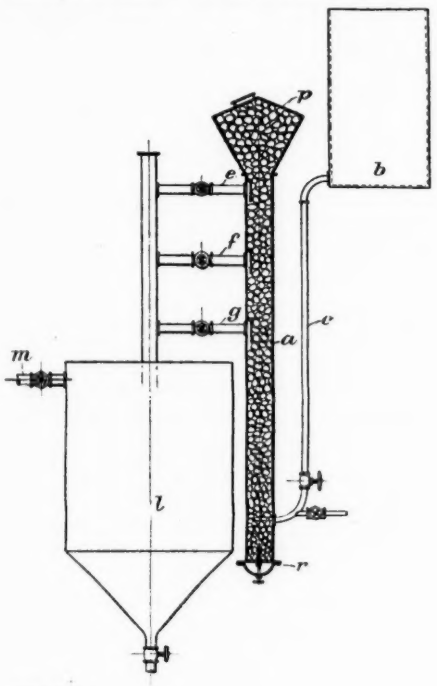
136,880. COKE OVENS AND THE LIKE, CARBONISATION OF FUEL BY VERTICAL. W. E. Davies, Brynawel, Vicarage Road, Penygraig, South Wales. Application date, December 19, 1918.

The coking chamber is heated by vertical flues arranged in the walls. The chamber is surrounded by four enclosing walls, parallel to one another and spaced apart, thus forming three annular spaces. The innermost annular space is divided by a zig-zag vertical partition into two series of vertical conduits of triangular cross section, the triangles having their bases on the two walls respectively. The middle annular space is divided by transverse partitions into rectangular vertical conduits, and the outer space is filled with non-conducting

material. The triangular flues adjoining the innermost wall comprise the heating flues, while the other triangular flues and the rectangular flues are waste gas flues, the waste gases being divided between them in proportions determined by a suitable valve. The flues may be divided into short self-contained sections by horizontal partitions. The means for supplying the fuel and air, and the method of conducting the distillation are described in detail.

136,896. CHEMICAL REACTIONS, METHOD AND APPARATUS FOR CARRYING OUT. T. Hughes, 265, Strand, London, W.C.2. Application date, December 21, 1918.

The apparatus is for carrying out chemical reactions involving the action of a liquid on a solid, with the evolution of gas, such as the treatment of witherite with hydrochloric acid to produce barium chloride and carbon dioxide, the generation of sulphuretted hydrogen from iron sulphide, or hydrogen from galvanised scrap, the extraction of metal constituents from ores, &c. The tubular vessel, *a*, is filled with the solid material in lumps, and kept constantly supplied from the hopper, *p*, while the liquid is contained in the tank, *b*, and is supplied to the bottom of the vessel, *a*, through the tube, *c*. A froth is formed in the vessel, *a*,



136,896

and is forced upwards through the column of solid material by the pressure of gas generated below. The finely divided condition of the liquid ensures the completion of the chemical reaction, and the exhausted froth passes out through one of the pipes, *e*, *f*, or *g*, and thence to the closed tank, *l*, in which the froth subsides. The rate of flow of the liquid from the tank, *b*, is adjusted in accordance with the rate of the chemical reaction, and may be varied to suit the outlets, *e*, *f*, *g*. The gas escapes by the pipe, *m*, and is collected. The method may also be used for separating light insoluble products carried up with the froth, which pass to the vessel, *l*, and are then separated from the liquid by a floating syphon decanter. Heavy insoluble matter is discharged from the vessel, *a*, through the valve, *r*, and regulating valves are provided in the various liquid and gas pipes where shown. The apparatus is intended for large scale operations.

136,927. VARNISHES OR DOPES, MANUFACTURE OF. Titanite Ltd., 175, Piccadilly, London, W.1.; and P. E. Bowles, Merok, Radlett, Herts. Application date, January 7, 1919.

It is known that the viscosity of cellulose ester varnish or dope may be retained for a considerable time by the addition of a small quantity of an organic polybasic acid, but in this case an internal coating of the storage drum is necessary. It is now found that the coating is rendered unnecessary if the organic acid is replaced by boric acid sufficient to give an acidity of at least 0·2 per cent.

136,960. ELECTRIC FURNACES. T. H. Watson & Co. (of Sheffield), Ltd., Lancaster Street; H. A. Greaves, 25, Raven Road; H. Etchells, 231, Oakbrook Road; and W. Travis, 40, Montgomery Road, all in Sheffield. Application date, February 21, 1919.

An electrically conductive "acid" lining for an electric furnace consists of a layer of broken chromite surmounted by a "ramming" of crushed silica bricks mixed with tar or pitch, and with or without finely divided metal. This layer is about 6 in. in depth to keep the molten material from contact with the chromite which is in contact with the electrical conductor.

136,979. CALCIUM CITRATE, PURIFICATION OF, AND THE MANUFACTURE OF CITRIC ACID. H. D. Golding, J. Raschen, and The United Alkali Co., Ltd., Cunard Building, Liverpool. Application date, March 20, 1919.

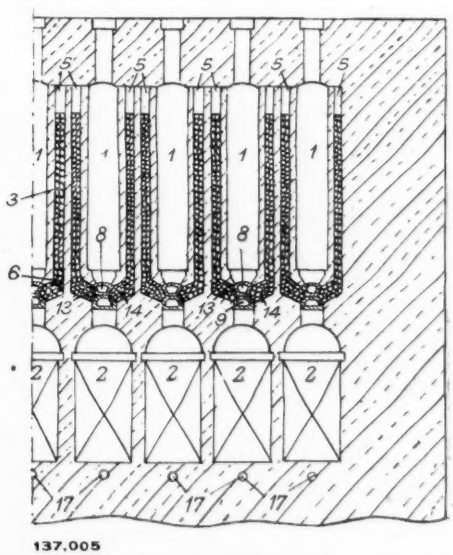
Crude calcium citrate is treated with sulphurous acid to obtain a solution of citric acid and calcium bisulphite, and impurities are filtered off. The sulphur dioxide is boiled off, and calcium citrate is re-formed and precipitated, and finally filtered and washed. The purification may be repeated if necessary. The purified calcium citrate is then decomposed by dilute sulphuric acid to obtain citric acid which is concentrated and crystallised.

136,992. ANALYSING GASES, ABSORPTION APPARATUS FOR. P. R. Boulton, 8, Holly Lane, Erdington, Birmingham. Application date, April 10, 1919.

The apparatus is principally for estimating carbon dioxide in flue gasses. A sample of the gas is drawn through a desiccating chamber into a pump cylinder by the upward stroke of the piston. The piston is returned to the bottom of the cylinder, and drives the gas through an absorption chamber back to the cylinder on the upper side of the piston, which is in communication with a pressure gauge tube. The piston is then raised until the pressure shown in the gauge tube is the same as before absorption, and the extent of movement of the piston gives a measure of the proportion of gas absorbed.

137,005. COKE OVENS. W. P. Thompson, Liverpool (from Fours et Procédés Mathy, Société Anonyme, 2, Rue des Dominicains, Liege, Belgium.) Application date, June 4, 1919.

The ovens are heated by surface combustion methods. A pair of recuperators, 2, are arranged below each retort, 1, for



137,005

heating the air, and/or gas for combustion. A series of vertical flues, 3, are arranged in the walls separating the retorts, and are

connected at their upper ends by horizontal flues, 5, and at their lower ends by horizontal flues, 6. The bed of each retort contains two superposed longitudinal passages, 8 and 9. Air for combustion passes through the passages, 17, to the recuperators, 2, and thence through the passages, 9, to the spaces, 13, 14, at the base of the flues, 3. Gas for combustion passes through the passages, 8, to the spaces, 13, 14. The vertical flues, 3, horizontal flues, 6, and spaces, 13, 14, are filled with porous refractory material in which surface combustion takes place to heat the retorts. Some of the flues, 3, at the centre of the brickwork are not filled, and are used for conveying the burnt gases to passages leading to the recuperators.

International Specifications Not Yet Accepted

135,186. MANGANESE AND ITS ALLOYS. Aktiebolaget Ferrolegeringar, 1, Hamngatan, Stockholm. International Convention date, November 12, 1918.

A manganese alloy comparatively rich in silicon, *e.g.*, containing 20 per cent. or more of manganese, and 10 per cent. or more of silicon, is oxidised by means of air or oxygen with or without manganese oxides or lime to produce manganese or manganese alloys low in carbon and silicon. The silico-manganese may be produced, and the silicon oxidised, in the same or in different furnaces; or the solid silico-manganese may be mixed with the oxidising agents and heated; or the molten silico-manganese may be mixed with lime or manganese oxide and heated in a basic, neutral, or acid-lined Bessemer converter; or a raw material containing manganese may be reduced with carbon to form a manganese silicide which is then oxidised.

135,187. CHROMIUM AND ITS ALLOYS. Aktiebolaget Ferrolegeringar, 1, Hamngatan, Stockholm. International Convention date, November 15, 1918.

The processes described in 135,186 above are applied to chromium. In the case in which a molten silicon-chromium alloy is Bessemerized in a converter, the lining may contain oxides of chromium, with or without chrome ore, lime, dolomite, magnesite, or quartz.

135,197. CRACKING HYDROCARBONS. Naamlooze Vennootschap Nederlandsche Lichte Olie Maatschappij, 148, Hooftstraat, Amsterdam. (Assignees, of Naamlooze Vennootschap Hollandsche Benjob en Benzine Maatschappij, Amsterdam.) International Convention date, November 12, 1918.

To convert tar oil into benzol and mineral oil into benzine, a mixture of the hydrocarbon vapour and steam is passed through a zone of heated coke having zones of lower temperature on either side. The coke may be contained in a vertical or inclined retort through which the vapour is passed upwards, and the central zone is heated to 500°—1,200° C.; the top and bottom zones are packed with porcelain, and kept at about 300° C. below the central zone. The vapour is preheated, and the temperature of the lower zone is maintained by the passage of the hot vapour. The temperature of the central zone is regulated by dampers in the flues. The central zone may be ⅓ to ⅔ the total height, being shorter for carbolic and creosote oils than for anthracene oil.

135,205. ARTIFICIAL THREADS; FILMS. Glanzfäden Akt.-Ges., Petersdorf-i-Riesengebirge, Germany. International Convention date, February 22, 1918.

The threads are spun from a viscose prepared from an alkali cellulose which is less hydrated than usual. The cellulose saturated with caustic soda lye is allowed to stand for 3—12 hours only, and is then treated with carbon bisulphide. The preparation and treatment of the viscose are fully described, and it is stated that the product may be spun into threads resembling wool and cotton, and is also suitable for the manufacture of films.

135,214. GAS RETORTS. Soc. Anon. d'Ougree Marihaye, Marihaye, Flemalle-Grande, Belgium. International Convention date, September 18, 1916.

Vertical retorts of rectangular cross section are mounted side by side and heated by flues in the dividing walls. The end walls of each retort are provided with openings arranged to form an elongated V adjacent to the V-shaped junction between the coked and uncoked fuel, and the gas is withdrawn through these openings into adjacent side flues.

135,217. COKE OVENS. Soc. Anon. d'Ougree Marihaye, Marihaye, Flemalle-Grande, Belgium. International Convention date, September 28, 1916.

The coke from a continuously operated vertical coke oven is discharged by one or more pairs of horizontal rotating rollers which are pressed inwards against the descending mass of coke with a pressure sufficient to support its weight.

135,221-2. ELECTRIC ENDOSMOSE. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.), 35, Lindenstrasse, Berlin. International Convention dates, December 20 and December 12, 1917, respectively.

135,221.—The supply passages and other spaces in communication with the treating chambers for electro-osmotically removing liquids, are lined with insulating material to prevent deposition of solid material in them, and consequent choking.

135,222.—Animal, vegetable, or mineral substances which are to be dehydrated are first forced into a cell of constant volume while water is removed, and the supply is then cut off and the material further treated while the volume of the cell is diminished by inward movement of the electrodes.

LATEST NOTIFICATIONS.

137,827 Centrifuges. C. A. Fesca & Sohn. June 26, 1915.
137,831. Cellulose, Manufacture of. C. A. Braun. August 5, 1916.
137,835. Vaporising Liquids, more particularly Dilute Nitric Acid, Process of. H. Frischer. August 31, 1916.
137,849. Sugar. Purification of Syrups and Wastes in the Manufacture of. M. von Wierusz-Kowalski. April 21, 1915.

Specifications Accepted, with Date of Application

116,104. Separation of Substances in Suspension in Gaseous Media, Apparatus for the Electrical Separation of. Soc. Gallot et Cie. and Soc. Poussin, Rondeaux, et Cie. May 22, 1917.
135,816. Electro-Osmotic Processes, Electrodes for. Elektro-Osmose Akt.-Ges. (*Graf Schwerin Ges.*) October 20, 1917.
137,080. Alloys, Manufacture of. H. L. Sulman, and W. B. Ballantine. July 2, 1918.
137,110. Ore Concentrators. G. A. Overstrom. December 31, 1918.
137,149. Coke Oven Doors, Bars for Supporting. J. Morrison. February 14, 1919.
137,159. Suction Conveyors. J. W. Jackson & Co., and A. P. Leigh. February 24, 1919.
137,168. Shaft Furnaces and Gas Producers. E. F. Chaudiere. March 3, 1919.
137,171. Fertiliser, and Method of Producing the Same. P. Radmann. March 5, 1919.
137,214. 3:6-Diamino-Acridine, Manufacture of. W. P. Thompson (*Poulenc Freres and R. Meyer*). May 1, 1919.
137,246. Broken granular material and grain-purifying machines. T. Parkinson. June 30, 1919.
137,247. Propylene, Process of Producing Chlorination Products of. E. C. R. Marks. (*Union Carbide Co.*) July 2, 1919.
137,252. Solid Fats to Liquid, Method of Reducing—and Apparatus Used Therefor. J. Danin. August 5, 1919.

Government Sale of Patented Articles

AN Order issued by the Board of Trade brings into operation as from January 21, Section 29 (3) of the Patents and Designs Act, 1907, as altered by Section 8 of the amending Act of 1919. Section 8 provides for the use of a patented invention by Government Departments by agreement with the patentee, and the present Order authorises the departments concerned to sell any articles made under such agreements which are no longer required for the services of the Crown.

DR. F. M. PERKIN reviewed the increasing application of electricity in the dyeing industry in a lecture before the members of the West Riding section of the Society of Dyers and Colourists at Bradford, on Thursday, January 22. He showed how generally caustic soda, chlorine and other materials used in the dye industry were now produced electrically, and pointed out the purity of the bleaching agents, solvents and scouring materials so produced. Replying to a subsequent vote of thanks, Dr. Perkin said that high temperature carbonisation was being tried for the purpose of manufacturing intermediates and other products for the dye industry, the coke being used for power purposes. He knew of £100,000 having been put down by private individuals to experiment with low temperature carbonisation, which would also provide benzol for use as motor spirit.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, January 29.

The market continues extremely active, and the volume of business is fully maintained.

Consumers are extremely anxious to cover their requirements over the next few months, and prices are still moving in the upward direction, and it would seem that we have not yet reached the top.

Supplies, however, are becoming more and more difficult to obtain for anything like prompt delivery, and a number of makers have sold the whole of their output for 1920.

The export demand continues unabated, but the scarcity of supplies is naturally restricting the volume of business definitely closed to a very large extent.

General Chemicals

ACID ACETIC.—There is a very active inquiry and good business is passing. Prices are firmer.

ACID CARBOLIC.—The price is advancing considerably, and very little is offering.

ACID FORMIC is without change and somewhat quiet. There is no sign of weakness however.

ACID OXALIC has again advanced in price, and is in short supply. The position is extremely firm.

AMMONIUM SALTS are apparently unchanged, and are in very good request. Prices are extremely firm.

ARSENIC.—There is very little coming forward from abroad, and the tendency is firmer.

BARIUM SALTS are more active, and advanced prices have been paid for early deliveries of chloride.

BLEACHING POWDER is in request for export, but with practically nothing offering from makers little business is possible.

CREAM OF TARTAR has sharply advanced, and is very strong.

FORMALDEHYDE is again higher in price, and is practically unobtainable.

LEAD ACETATE is again dearer, and in very good request.

LITHOPONE is still in short supply, and price is very firm. The arrivals from abroad are very small, and it is difficult to see from whence early relief is to come.

POTASSIUM PERMANGANATE.—The price is maintained at recent advanced prices, and supplies are scarce.

POTASSIUM BICHROMATE is extremely scarce, and premiums on makers' prices have been paid for early delivery.

PRUSSIATE OF POTASH is steady and firm, with little foreign material arriving.

SODIUM ACETATE is steadily inquired for, but price is without change. The volume of business passing is quite satisfactory.

SODIUM BISULPHITE.—Price is again firmer, and this material is becoming impossible to obtain for near delivery.

SODIUM CHLORATE is dull and slow of sale.

SODIUM CAUSTIC is steady and firm at last quoted figures, and there is a large inquiry on export account.

SODIUM NITRITE.—The position becomes increasingly difficult, and price is again higher. Shipments are coming forward very slowly.

SODIUM PHOSPHATE is again firmer, and apparently in short supply.

SODIUM PRUSSIATE.—The demand still continues and for near delivery little is offered. Price is higher, but can be taken as almost nominal.

SODIUM SULPHIDE.—The demand continues active and price is again higher. Supplies appear to be very light.

ZINC SALTS.—Business is very steady in this group, and sulphate is firmer.

Coal Tar Intermediates

The demand continues active for all intermediates, but for many products nothing like near delivery is possible, and manufacturers are in many cases too nervous to entertain forward business to any large extent, and this attitude under present conditions cannot be wondered at.

ACETANILIDE.—The demand continues active, and price is again firmer.

ANILINE OIL AND SALT.—There is no change to report.

BENZIDINE BASE is unobtainable on the spot, but it is understood that there are some parcels due for arrival.

BETA NAPHTHOL is extremely difficult at the present time, and makers are disinclined to quote for future delivery.

PARANITRANILINE is unobtainable for near delivery.

SALICYLIC ACID.—Price is again firmer for future delivery.

SULPHANILIC ACID.—A fair business has been transacted at prevailing levels.

Coal Tar Products

Prices for most coal tar products have stiffened somewhat during the week for various causes.

90 PER CENT. BENZOL has shown an upward tendency owing to the advance in the price of petrol, and is to-day worth about 2s. 3½d. f.o.r. makers' works.

CRESYLIC ACID remains firm, prices being about 3s. 4½d. for pale 97/99 per cent., and 2s. 10d. for dark 95/97 per cent.

CREOSOTE OIL is very fully booked, and has advanced to about 7¾d. f.o.r.

NAPHTHALENE remains steady, refined being about £19 to £20. 10s. a ton, and crude £8 to £9 a ton.

SOLVENT NAPHTHA.—The price is in the region of 3s. 3d.

HEAVY NAPHTHA.—The price is in the region of 2s. 10d.

PITCH.—The market has an upward tendency, and prices are irregular according to facilities for shipment. East Coast, 107s. 6d. to 112s. 6d.; London, 115s. to 125s.; West Coast, 100s. to 110s.

Sulphate of Ammonia

The position is unchanged, and the Home trade price remains at £21. 7s. 6d. per ton for January, and £21. 15s. per ton for February.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	0	to	0	3	3
Acetone oil	ton	77	0	0	to	80	0	0
Acetone, pure	ton	90	0	0	to	95	0	0
Acid, Acetic, glacial, 99-100%	ton	87	10	0	to	92	10	0
Acetic, 80% pure	ton	75	0	0	to	77	10	0
Arsenic	ton	70	0	0	to	75	0	0
Boric, cryst.	ton	72	10	0	to	73	10	0
Carbolic, cryst. 39-40%	lb.	0	1	2½	to	0	1	3
Citric	lb.	0	4	3	to	0	4	4
Formic, 80%	ton	110	0	0	to	115	0	0
Gallic, pure	lb.	0	7	0	to	0	7	3
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	65	0	0	to	70	0	0
Lactic, 60 vol.	ton	80	0	0	to	85	0	0
Nitric, 80 Tw.	ton	37	0	0	to	39	0	0
Oxalic	lb.	0	1	10	to	0	1	10½
Phosphoric, 1.5	ton	45	0	0	to	47	10	0
Acid, Pyrogallic, cryst.	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	6	to	0	2	9
Salicylic, B.P.	lb.	0	3	6	to	0	3	9
Sulphuric, 92-93%	ton	7	10	0	to	8	0	0
Tannic, commercial	lb.	0	4	3	to	0	4	6
Tartaric	lb.	0	3	5½	to	0	3	6½
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0

	per	£	s.	d.		£	s.	d.
Aluminium, sulphate, 14-15%	ton	15	0	0	to	15	10	0
Aluminium, sulphate, 17-18%	ton	18	10	0	to	19	0	0
Ammonia, anhydrous	lb.	0	1	9	to	0	2	0
Ammonia, .880	ton	32	10	0	to	37	10	0
Ammonia, .920	ton	20	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	7½	to		—	
Ammonia, chloride	ton	70	0	0	to	75	0	0
Ammonia, muriate (galvanisers)	ton	50	0	0	to	52	0	0
Ammonia, nitrate	ton	45	0	0	to	50	0	0
Ammonia, phosphate	ton	120	0	0	to	121	10	0
Ammonia, sulphocyanide	lb.	0	1	10	to	0	2	0
Amyl, acetate	ton	350	0	0	to	360	0	0
Arsenic, white, powdered	ton	70	0	0	to	72	0	0
Barium, carbonate	ton	13	0	0	to	14	0	0
Barium, carbonate, 2- 4%	ton	13	10	0	to	14	10	0
Chlorate	lb.	0	1	3	to	0	1	4
Chloride	ton	24	0	0	to	24	10	0
Nitrate	ton	50	0	0	to	51	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Bleaching powder, 35-37%	ton	18	0	0	to	18	10	0
Borax crystals	ton	41	0	0	to	42	0	0
Calcium acetate, grey	ton	23	0	0	to	25	0	0
Carbide	ton	28	0	0	to	30	0	0
Chloride	ton	9	0	0	to	9	10	0
Carbon bisulphide	ton	58	0	0	to	59	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	0	to	0	1	2
Cobalt acetate	lb.	0	7	0	to	0	7	6
Oxide, black	lb.	0	7	9	to	0	8	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	47	0	0	to	48	0	0
Cream Tartar, 98-100%	ton	287	10	0	to	292	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	235	0	0	to	250	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	3	10	0	to	3	15	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10
Iron perchloride	ton	40	0	0	to	42	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	95	0	0	to	100	0	0
Carbonate (White Lead)	ton	68	5	0	to	70	0	0
Nitrate	ton	70	0	0	to	75	0	0
Litharge	ton	66	0	0	to	70	0	0
Lithophone, 30%	ton	48	10	0	to	50	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt.	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	13	0	0	to	13	10	0
Sulphate (Druggists')	ton	17	10	0	to	18	0	0
Methyl acetone	ton	89	0	0	to	90	0	0
Alcohol, 1% acetone	gall.	0	11	6	to	0	12	0
Nickel ammonium sulphate, single salt	ton	47	10	0	to	52	10	0
Potassium bichromate	lb.	0	1	6	to	0	1	7
Carbonate, 90%	ton	102	0	0	to	105	0	0
Chloride	ton	Nominal.						
Potassium Chlorate	lb.	0	1	1	to	0	1	2
Meta-bisulphite, 50-52%	ton	250	0	0	to	260	0	0
Nitrate, refined	ton	68	0	0	to	70	0	0
Permanganate	lb.	0	4	9	to	0	5	0
Prussiate, red	lb.	0	6	0	to	0	6	3
Prussiate, yellow	lb.	0	2	2	to	0	2	4
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	4	15	0	to		—	
Seconds	cwt.	4	10	0	to		—	
Sodium acetate	ton	50	0	0	to	53	0	0
Arsenate, 45%	ton	50	0	0	to	52	0	0
Bicarbonate	ton	10	10	0	to	11	10	0
Bichromate	lb.	0	1	0	to	0	1	1
Bisulphite, 60-62%	ton	38	0	0	to	40	0	0
Chlorate	lb.	0	0	6	to	0	0	6½
Caustic, 70%	ton	27	10	0	to	28	10	0
Caustic, 76%	ton	28	0	0	to	28	10	0
Hydrosulphite, powder, 85%	lb.	0	3	3	to	0	3	6
Hyposulphite, commercial	ton	21	0	0	to	22	0	0
Nitrite, 96-98%	ton	73	10	0	to	75	0	0
Phosphate, crystal	ton	36	0	0	to	38	0	0
Sodium, Perborate	lb.	0	2	1	to	0	2	2
Prussiate	lb.	0	1	5	to	0	1	6
Sulphide, crystals	ton	16	0	0	to	16	10	0
Sulphide, solid, 60-62%	ton	31	0	0	to	33	0	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium, carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	85	0	0	to	90	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	40	0	0	to	42	10	0

	per	£	s.	d.		£	s.	d.
Sulphur, Flowers	ton	24	0	0	to	26	0	0
Roll	ton	23	0	0	to	25	0	0
Tartar emetic	lb.	0	3	4	to	0	3	6
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	2	10	to	0	3	0
Protochloride (tin crystals)	lb.	0	1	10	to	0	1	11
Zinc chloride, 102 Tw.	ton	24	0	0	to	25	10	0
Chloride, solid, 96-98%	ton	50	0	0	to	52	10	0
Oxide, 99%	ton	77	10	0	to	80	0	0
Oxide, 94-95%	ton	60	0	0	to	62	10	0
Dust, 90%	ton	70	0	0	to	72	10	0
Sulphate	ton	22	10	0	to	23	10	0
Oxide, Redseal	ton	75	0	0	to	80	0	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	6
Alphanaphthol, refined	lb.	0	3	9	to	0	4	0
Alphanaphthylamine	lb.	0	3	3	to	0	3	6
Aniline oil, drums extra	lb.	0	1	6	to	0	1	7
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.	0	1	5	to	0	1	6
Benzaldehyde (free of chlorine)	lb.	0	6	0	to	0	6	6
Benzidine, base	lb.	0	8	6	to	0	9	0
Benzidine, sulphate	lb.	0	7	0	to	0	7	6
Benzoic, acid	lb.	0	5	0	to	0	5	3
Benzoate of soda	lb.	0	5	0	to	0	5	3
Benzyl chloride, technical	lb.	0	2	3	to	0	2	6
Betanaphthol benzoate	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	3	9	to	0	4	0
Betanaphthylamine, technical	lb.	0	7	6	to	0	8	0
Croceine Acid, 100% basis	lb.	0	4	9	to	0	5	0
Dichlorbenzol	lb.	0	0	5	to	0	0	6
Diethylaniline	lb.	0	7	0	to	0	7	6
Dinitrobenzol	lb.	0	1	3	to	0	1	4
Dinitrochlorbenzol	lb.	0	1	3	to	0	1	4
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	7	to	0	1	8
Dinitrophenol	lb.	0	1	6	to	0	1	9
Dimethylaniline	lb.	0	3	9	to	0	4	0
Diphenylamine	lb.	0	4	0	to	0	4	6
H-Acid	lb.	0	12	6	to	0	13	6
Metaphenylenediamine	lb.	0	5	0	to	0	5	3
Monochlorbenzol	lb.	0	0	9	to	0	0	10
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	0	to	0	8	0
Naphthionic acid, crude	lb.	0	4	3	to	0	4	6
Naphthionate of Soda	lb.	0	4	6	to	0	4	9
Naphthylamin-di-sulphonic-acid	lb.	0	4	6	to	0	5	0
Nitronaphthaline	lb.	0	1	4	to	0	1	5
Nitrobenzol	lb.	0	0	10	to	0	0	11
Nitrotoluol	lb.	0	1	3	to	0	1	6
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	3
Orthotoluidine	lb.	0	2	2	to	0	2	3
Orthonitrotoluol	lb.	0	1	6	to	0	1	9
Para-amidophenol, base	lb.	0	14	0	to	0	15	0
Para-amidophenol, hydrochlor	lb	0	15	6	to	0	16	0
Paradichlorbenzol	lb.	0	0	4	to	0	0	5
Paranitraniline	lb.	0	5	6	to	0	6	0
Paranitrophenol	lb.	0	3	9	to	0	4	0
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled	lb.	0	13	0	to	0	13	6
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	10	6	to	0	11	6
R. Salt, 100% basis	lb.	0	5	0	to	0	5	6
Resorcin, technical	lb.	0	11	0	to	0	12	0
Resorcin, pure	lb.	0	17	6	to	1	0	0
Salol	lb.	0	4	9	to	0	5	6
Shaeffer acid, 100% basis	lb.	0	4	0	to	0	4	6
Sulphanilic acid, crude	lb.	0	1	6	to	0	1	8
Tolidine, base	lb.	0	12	0	to	0	12	6
Tolidine, mixture	lb.	0	2	9	to	0	3	0

We are informed by Borax Consolidated, Ltd., that the present prices of borax and boric acid packed in 2 cwt. bags are as follows: Commercial quality: Crystal borax, £41 per ton; powdered, £42 per ton; crystal boric acid, £74 per ton; powdered boric acid, £76 per ton.

MORE THAN 2,000 stands have been reserved for the Lyons Fair, which opens on March 1. The present number of exhibitors includes: Chemistry, 40; perfumery, raw materials and finished articles, 70; mechanical engineering and metallurgy, 56; tannery and currying, 70.

Van den Berghs, Ltd.

Extended Scope of Business

THE twentieth ordinary general meeting of Van den Berghs, Ltd., was held in London on Monday, Sir Herbert Mackworth Praed, chairman of the company, presiding.

After referring to the unprecedented prosperity of the company, largely due to the foresight of the directors and the policy adopted by them during the war, the chairman reviewed at length the present scope of the business of the firm. In March next (he said) the company will have been established twenty-five years, and never in its history has its scope been anything like so widespread as it is to-day. We have now nearly forty factories in all parts of Europe, comprising margarine, condensed milk, soap, and oil crushing, extracting and refining, and hardening factories, in addition to the control we maintain over several other businesses. All of these factories are in a thorough state of efficiency. The acquisition, extension, and equipment of the factory at Fulham, which actually began working in February, 1918, is perhaps the company's greatest and most noteworthy achievement of the war period and one which stands out more prominently than any other. As soon as your directors foresaw that the difficulties of maintaining supplies from the Continent were likely to prove insurmountable they devoted all their powers to meeting the exigencies of the position, and the fact that the English factory was in the course of a few months in working order and turning out large quantities of margarine for the British trade shows indisputably with what energy they applied themselves to the task, which was no easy one. Since then the factory has continuously worked on its full output, and we are now regularly turning out there the second largest quantity of all the factories in the British Islands. The entire output at this factory is disposed of in this country, and we are able to sell all that we can produce. The whole character of our trade in margarine in this country during the five years of the war has been subjected to a considerable change, and the amount of our business has been enormously increased. For a great number of years previous to 1914 we had been gradually fighting down the prejudice which had existed in the minds of a portion of the public against the use of margarine, and it was due to the enterprise and research which had been devoted to the improvement in the methods of manufacture, and to the suitable preparation of the raw materials to be used, that this country was kept supplied with more or less ample quantities of good edible fats during the most trying period of the war when the failure of the butter supplies would otherwise have rendered the position exceedingly serious. In pre-war days the amount of butter imported into this country was between 4,000 and 5,000 tons per week, but one by one many of the main sources of supplies were cut off as the war progressed, and even to-day—14 months after the signing of the armistice—the quantity of imported butter available is little more than 1,000 tons a week. The price, too, has increased so largely that butter as an article of daily consumption is beyond the reach of many who formerly used nothing else. This naturally means an enormous increase in the consumption of margarine, especially of the higher grade qualities. The actual percentage of profit on sales in this country is small, smaller, in fact, than in pre-war days, but it is the enormous increase in the volume of sales that has made all the difference in the general profits of the company.

Raw Materials

Turning to the question of raw materials, Sir Herbert Praed said that whereas before the war the European markets for nuts, oil seeds and oils were of supreme importance, to-day we were doing a large and steadily increasing business with the countries of origin. For this purpose organisations had been created and connections opened up all over the globe, notably on the West Coast of Africa, the Dutch East Indies, the Straits Settlements, Ceylon, North and South America, China, Japan, &c. Since de-control an unprecedented and almost uninterrupted rise in the prices of all oils and fats had occurred, so much so that now it was quite the usual thing to find their raw materials quoted at three times pre-war prices, or even more. This phenomenal advance was to some extent due to the abnormal rates of exchange, but it could not be denied that one of the principal causes was the great and ever-growing demand for oils and fats all over the world. High freights also played a part, and these were to a large extent due to the excessive delays in the discharge of the boats, which, together with the unsatisfactory state of the means of inland transport, necessitated the retention of extremely large stocks of raw materials at the factories. A fairly recent development had been the establishment of up-to-date oil mills in the countries where the seeds and other commodities of their manufacture were produced, and this had revolutionised the mode of shipping the oil. To promote this method of shipping the company were equipping their factories with tanking installations which enabled them to handle any class of oil in almost any quantity. During the war a number of steamers were acquired by a subsidiary of the company, at prices much below present values, and these boats had proved exceedingly useful in bringing a proportion of the raw materials home. The company's stocks and purchases of raw materials for forward delivery were not only very large but considerably below to-day's rates of value, and as the raw material markets still showed signs of further advances, prospects were decidedly satisfactory for the near future.

At an extraordinary general meeting held subsequently, resolutions were carried to increase the capital of the company to £3,575,000 and to sub-divide each of the 625,000 Ordinary shares of £1 each into four fully-paid shares of 5s. each, of which three shares should be called Preferred Ordinary shares and the remaining fourth share should be called an Ordinary share.

Catalogues Received

Chas. W. Cook, Ltd.

An illustrated booklet issued by this firm describing the uses, advantages, method of attachment, size and price of the Curnon Steam Meter for the measurement of the flow of steam in pipes. The booklet contains explanatory photographs, reproductions of sections of the apparatus and a table giving the approximate capacities of steam pipes in pounds of steam per hour (saturated), for use in the design of pipe lines for velocities up to 100 feet per second. The meter indicates and records the exact rate at which steam is flowing, so that at the end of a day's working the demand required at any particular time can be seen, as well as the total steam passed during the day, the ultimate purpose being the elimination of waste.—174, Oxford Road, Manchester. Pp. 11.

Chas. Page & Co., Ltd.

Beginning with an interesting note on the state of the market, and the price tendencies of a number of classified products, the catalogue is a concise price list of the chemicals supplied by this firm. These are arranged under categories alphabetically. Each page is divided into three columns, the first containing a description of the products, the second stating the price, and the third the manner in which each is delivered. The list includes coal tar and ammonia products, fertilisers, tanning and dyeing extracts, colours, sizing materials, &c. Prices for the following can be quoted in quantity: Peroxide of hydrogen, acetate of lead, zinc salts, oxalic acid, acetate of soda, phosphate of soda, chrome colours, lithophone, naphthionic acid, liquid resin, dimethylaniline, barium salts, gelatines and prussiates. C.i.f. quotations can be given for any available port.—47/51, King William Street, London, E.C.4. Pp. 24.

Hygeia Respirator Co., Inc.

This New York firm, who specialise in safety products for factories, mines, workshops, &c., issue an illustrated catalogue of their respirator masks made of prepared impervious rubberised cloth and so constructed as to eliminate all dead air. Various models are shown adapted to particular industries and designed to protect the worker against ordinary dust in textile and other works, or against more poisonous dust, fumes, gases, &c., in chemical works. One type is fitted with an eye-protector. These devices for protecting the health of the worker are based largely on experience in gas warfare, and useful hints are given as to their use.—142, 5th Avenue, New York City, U.S.A. Pp. 4.

Adam Hilger, Ltd.

The application of optical instruments to the problems of industrial chemistry is progressing so rapidly that this booklet giving in broad outline the uses of the various instruments in which this firm specialises is very welcome. To the uninitiated the variety of these applications is surprising, ranging as it does from brewing, dyestuffs, tanning and soap, to gas works practice, mining, rubber and wood distillation. The particulars given are concise and practical, and we can confidently recommend all our readers to study them, as scientific control with the aid of such high-grade instruments is often translatable into pounds, shillings and pence. No attempt is made to give detailed descriptions or particulars, which are, however, furnished on application to the firm's research laboratories and technical advisers, together with a free preliminary report on the prospects of success in case of any new application.—75A, Camden Road, N.W.1.

Powerite Steam Jointing Company, Ltd.

We have received from this company samples of their "Powerite" for steam jointing and packing, accompanied by illustrated descriptive leaflets. The firm, with a very long experience in the treatment of joint troubles, claim that this material will never burn out, blow out or squeeze out. It is a jointing of great tensile strength, combined with elasticity. Long pipe lines with extremes of temperatures and varying pressures will always offer difficult joints, particularly with rough pitted or unplaned flanges. It is claimed for "Powerite" that it will make a tight joint on the most uneven surfaces. Directly it is fitted and heated by the steam it will at once "settle" and reinforce the joint at its weakest spot. In the words of the makers it "defeats the action of steam, acid and oils and alkalis," and has great resistance against high or low pressure, saturated or super-heated steam. It can be used with safety in any country as it is not affected by atmospheric conditions.—16-17, Devonshire Square, E.C.2.

Company News

INTERNATIONAL NICKEL.—A quarterly dividend of 1¼ per cent. on preferred stock has been announced, payable February 2, to holders on record January 15.

SCOTTISH OILS.—An interim dividend of 7 per cent. per annum on the participating preference shares has been declared for the six months to October 31 last, payable February 10 to holders registered January 31.

GUEST, KEEN & NETTLEFOLDS & JOHN LYSAGHT.—It is reported that these firms are purchasers of the controlling interest in Meiros Collieries, Ltd., which holds a mineral area of 5,000 acres at Llanharan, with an annual output of 500,000 tons of gas and steam coal.

LONDON NITRATE.—The profit on trading for the year to June 30 last was £42,623, and £9,609 was brought forward. The net balance, after payment of interest, income tax, expenses through stoppage of works, &c., is £16,993, out of which a dividend of 1s. per share, free of tax, has been paid, leaving £8,993 to carry forward.

PREMIER OIL.—The statutory meeting of the Premier Oil Co., which is being formed to take the place of the Premier Oil & Pipe Line Co., Ltd., was held in London on Tuesday, Mr. F. Walker (chairman of the company) presiding. Mr. Walker said the reconstruction had been found necessary in order to cope with ingenious and unscrupulous German and Austrian efforts to get the company into their own hands, both before and during the war.

PEARSON & KNOWLES.—A circular has been issued to the shareholders of the Pearson & Knowles Coal & Iron Company, Ltd., announcing an offer made by Sir W. G. Armstrong, Whitworth & Company, Ltd., for the purchase of the ordinary shares of the company at £1 10s. per share. The offer is subject to the condition that holders of 800,000 shares (or any smaller number Armstrongs may accept) agree to the sale before February 11, and that the purchase at £1 10s. per share shall be ex the interim dividend of 1s. per share declared on January 23.

PERU SYNDICATE, LTD.—The company, which has been reorganised with a capital of £150,000, divided into 600,000 shares of 5s. each, of which 200,000 have already been issued, offer 100,000 at the price of 15s. per share. This issue will provide the company with a sum of £75,000 for working capital, less underwriting, brokerage, &c., in connection with their various oil lands, potash deposits and mining properties in Peru, Colombia and Trinidad. The 300,000 shares still unissued will provide ample funds for the drilling of wells on the Mancoia oilfields.

INTERNATIONAL PETROLEUM CO.— A dividend of 50 cents. (equivalent to 2s. 1d.) per share has been declared, payable on and after February 2, in respect of the shares specified in any bearer share warrants of the company within three days after coupons No. 5 attached to said bearer share warrants have been presented and delivered at the following banks: The Farmers' Loan & Trust Co., Ltd., 26, Old Broad Street, E.C.2; the Royal Bank of Canada, 60, Church Street, Toronto, Canada; the Farmers' Loan & Trust Co., 16-22, William Street, New York, U.S.A.; or the offices of the International Petroleum Co., Ltd., 56, Church Street, Toronto, Canada; such presentation and delivery to be made on or after January 29. Payment to shareholders of record at the close of business on January 29, and whose shares are represented by registered certificates, will be made by cheque mailed from the company's office on January 31.

LEVER BROS. & NIGER CO.—Lever Bros., Ltd., have offered to purchase all the issued Ordinary shares in the Niger Co., Ltd., at £6 10s. per share, payable in cash on or before July 1 next, together with interest on the price at the rate of 7 per cent. per annum from Jan. 1 last. A provisional agreement, dated January 22, has been entered into for this purpose between the chairman and the vice-chairman of the Niger Co. and Lever Bros., which is open for adoption by all holders of Ordinary shares who notify their acceptance of it within 14 days. The purchasers will take all dividends on the shares sold which may be declared after January 23, but the rate of interest payable on the cash price is fully equivalent to a year's dividend of 10 per cent. and bonus of 10 per cent., as paid in 1918 and in 1919. The Niger directors recommend the Ordinary shareholders to take advantage of this offer, which is subject to the condition that acceptance must be notified before February 6, and the further proviso that Lever Bros. reserve the right to cancel the agreement altogether if acceptances for at least 75 per cent. of the issued Ordinary shares are not received within the stipulated time. The offer does not extend to any Preference shares in the Niger Company.

W. & H. M. GOULDING.—The directors of W. & H. M. Goulding (manufacturers of chemical manures, sulphuric acid, &c., Dublin) have decided to issue 10,778 new ordinary shares of £5 each, at a premium of £2 10s. per share. These shares will rank for dividend (including the dividend for the current year, payable at July 31 and December 31 next) *pari passu* with the existing ordinary shares. The new shares will be allotted as nearly as possible in the proportion of one new for each five ordinary registered on January 21; £2 10s. per share will be payable on acceptance not later than February 7, and the remaining £5 per share on allotment not later than March 6, 1920. Letters of acceptance and renunciation have been posted to the shareholders.

Stocks and Shares

Commercial, Industrial, &c.

	Quotations—Jan. 21.	Quotations—Jan. 28.
Alby United Carbide Factories, Ord....	1 13/16–1 15/16	13/16–15/16
Associated Portland Cement Manufrs. (1900) Ltd., Ord.	27/9–28/9	28/6–29/6
Bell's United Asbestos Co., Ltd., Ord.	1⅞–2¼	1⅞–2¼
Bleachers' Association, Ltd., Ord.	2 7/16–2 9/16	2 7/16–2 9/16
Borax Consolidated, Ltd., Prefd. Ord.	4–4½	4–4½
Bradford Dyers' Assoc. Ltd., Ord.	3⅛–3¼	3⅛–3¼
British Aluminium Co., Ltd., Ord.	1 11/16–1 13/16	1 11/16–1 13/16
British Oil and Cake Mills, Ltd., Ord ...	2 5/16–2 5/16	2 5/16–2 5/16
British Portland Cement Manufrs., Ltd., Ord.	32/0–34/0	34/0–36/0
Brunner, Mond & Co., Ltd., Ord.	2⅛–2¼	2 1/16–2 3/16
Castner-Kellner Alkali Co., Ltd.....	3⅞–4⅛	3⅞–4⅛
China Clay Corporation, Ltd., Ord.	¼–⅜	¼–⅜
Cook (Edward) & Co., Ltd., 4% 1st Mort. Deb. Stock Red.....	57–61	57–61
Courtaulds, Ltd.....	9–10	9¼–9¾
Crosfield (Joseph) & Sons, Ltd., Cum. 6% Prefce	8 7/32–8 9/32	8 7/32–8 9/32
Curtis's & Harvey, Ltd. 4¼% 1st. Mort. Deb. Stk. Red.	69–71	69–71
Electro Bleach & By-Products Ltd., Ord.....	16/3–17/0	16/6
Explosives Trades, Ltd., Ord	23/6–24/6	24/0–25/0
Field (J. C. & J.), Ltd., Ord	1⅜–1⅝	1⅜–1⅝
Greenwich Inlaid Linoleum (Fredk. Walton's New Patents) Co., Ltd., Ord.	⅜–⅞	⅜–⅞
Harrisons & Crosfield, Ltd., Prefd. Ord.	1¼–1⅜	1¼–1⅜
India Rubber, Gutta Percha & Tel. Wks. Co., Ltd., Ord	15½–16½	15½–16½
Lawes' Chemical Manure Co., Ltd., Ord.	4¾–5¾	4¾–5¾
Lever Bros., Ltd., 6% Cum. "A" Prefce.....	17/4½–18/1½	17/6–18/3
Do. 6½% Cum. "B" Prefce.....	19/3–20/0	19/0–19/9
Magadi Soda Co., Ltd., Ord	18/6–19/6	19/0–20/0
Manganese Bronze & Brass Co., Ltd., Ord.	⅝–¾	⅝–¾
Maypole Dairy Co., Ltd., Defd. Ord. ...	1–1 1/16	1–1 1/16
Mond Nickel Co., Ltd., 7% Cum. Pref.	1 1/16–1 3/16 ×d	1 1/16–1 1/16
Do. 7% Non. Cum. Pref.....	⅞–1 ×d	⅞–1
Pacific Phosphate Co., Ltd., Ord.....	4⅝–4⅞	4⅝–4⅞
Power-Gas Corporation, Ltd., Ord	⅝–¾	⅝–¾
Price's Patent Candle Co., Ltd., 5% Deb. Stk. Red.	83–93	83–93
Salt Union, Ltd., Ord.	1 29/32–1 31/32	1 29/32–1 31/32
United Alkali Co., Ltd., Ord.	1 1/16–1 1/8	1 1/16–1 1/8
Val de Travers Asphalte Paving Co., Ltd.	¾–1	¾–1
Van den Berghs, Ltd., Ord.	3¾–4	3⅞–4⅛
Walkers, Parker & Co., Ltd.	1 3/16–1 5/16	1 5/32–1 3/32
Welsbach Light Co., Ltd.....	2½–2¾	2⅝–2⅝
Gas, Iron, Coal and Steel		
Armstrong (Sir W. G.) Whitworth, Ltd., Ord.....	35/6–36/6	1 13/16–1 7/8
Ebbw Vale Steel, Iron & Coal Co., Ltd., Ord.....	1⅜–1 7/16	1⅜–1 7/16
Gas Light & Coke Co., Ordinary Stock (4% Stand.).....	56–59	54–57
Hadfield's, Ltd., Ordinary	2 1/16–2 3/16	2 3/16–2¼
South Metropolitan Gas Co., Ordinary (4% Stand.).....	56–59	55–58
Staveley Coal & Iron Co., Ltd., Ord....	1⅞–2	1⅞–2
Vickers, Ltd., Ordinary	35/6–36/6	36/0–37/0
Mines, Nitrate, &c.		
Anglo-Chilian Nitrate and Rly. Co., Ltd., Ord.....	17½–18½	18½–19½
Antofagasta Nitrate Co. Compañia de Salitres de Antofagasta) 5½% 1st. Mt. Debs. Red.....	85–90	85–90
Lagunas Nitrate Co., Ltd.....	1½–1½	1⅝–1⅝
Rio Tinto Co., Ltd., Ord. (Bearer)	46–48	44–46
Tarapaca & Tocopilla Nitrate Co., Ltd.	18/6–19/6	21/0–23/0
Oil and Rubber		
Anglo-Java Rubber & Produce Co., Ltd.	7/7½–8/1½	7/7½–8/1½
Anglo-Maikop Corporation, Ltd., Ord.	15/16–1	15/16–1
Anglo-Malay Rubber Co., Ltd.	14/3–14/9	14/1½–14/7½
Anglo-Persian Oil Co., Ltd., Cum. 6% Part.....	1 3/16–1¼	1 3/16–1¼
Burmah Oil Co., Ltd., Ord.....	21⅜–21⅝	21 15/16–22 3/16
Chersonese (F.M.S.) Estates, Ltd.	4/3–4/6	4/3–4/6
Linggi Plantations, Ltd., Ord.....	3⅜–3½	3⅜–3½
Mexican Eagle Oil Co., Ltd. (Cia. Mexicana de Pet. "El Aguila" S.A.) Ordinary (Bearer)	12¼–12⅜	11 11/16–11 15/16
"Shell" Transport & Trading Co., Ltd., Ord.	12 13/16–13 1/16 xd	14–14½ xd
Do. 5% Cum. Pref.....	8½–9	8½–9

The Indian Market

(From our Own Correspondent)

Commercial Development

American manufacturers are quoting c.i.f. Indian ports.

In Burma trouble has been experienced in connection with the adulteration of commercial products, and as a panacea it is suggested that offending dealers should be "blacklisted."

Trade with South Africa and Australia has increased very considerably, in consequence of the European war, and steps are being taken to develop this trade by the opening up of new businesses. Australia, by reason of her geographical position, and consequent ability to supply goods promptly, is specially suitable as a hunting ground for Indian business men. The Russian muddle is also reflected in the Indian market, trade with Chinese Turkestan and China proper having increased.

The Indian Institute of Science has recently been investigating problems connected with industrial chemistry, and the manufacture of white lead and gelatines. It has already been decided to instal a laboratory furnace and a plant for re-distilling lemon grass oil.

The *Madras Times* states that among the growing industries of the West Coast is the group formerly controlled by the Basel Mission, an alien body, largely German in composition, but which, after the war, was taken under official supervision, and is now likely to be taken over by a British syndicate to be worked on quasi-philanthropic lines. Beginning with the original object of providing work for the converts of the Basel Mission, the industries have grown with surprising rapidity, and now include big weaving factories, tile factories, a modern printing press, and a mechanical department, all yielding handsome profits, the bulk of which are devoted to mission work. It is not generally known that it was with them that the particular dye known as khaki originated, having been discovered by Mr. Haller, who was the mission weaving expert in the forties of the last century.

New Companies

Numerous companies have recently been floated, some of which are given below, together with the capital to be issued in each case:—

Krishna Agricultural Association, Madras, Rs.500,000.
Western India Chemical Works, Bombay, Rs.1,000,000.
Allahabad Tanneries, Allahabad, Rs.1,000,000.
Premier Soap Co. of India, Calcutta, Rs.2,500,000.
Central Provinces Portland Cement Co., Calcutta, Rs.10,000,000.
Dutta Chemical Works, Calcutta, Rs.200,000.
Calcutta Chrome Tanning Co., Calcutta, Rs.600,000.
Samastipur Central Sugar Co., Cawnpore, Rs.2,500,000.

Quinine Production and Prices

Quinine is very scarce in India, and as a result the retail price has risen as high as Rs.88 per lb. A system of distribution of quinine sulphate in 10-grain packets at 1 pice per packet (roughly one farthing) has been established, and in two months the Madras Presidency distributed over 2½ million of these through the post offices.

Artificial Fertilisers

The use of artificial fertilisers in India is claiming increased attention, and experiments have recently been made in Western India by the Bombay Agricultural Department. This body estimates the amount for field crops per acre as follows:—

Tobacco: Sulphate of potash, 150 lb.; superphosphate, 112 lb.; nitrate of soda, 285 lb.

Potatoes: Sulphate of potash, 150 lb.; superphosphate, 112 lb.; sulphate of ammonia, 120 lb.

Cotton (two dressings): (*a*) Farmyard manure, 2 tons; superphosphate, 200 lb.; nitrate of soda, 135 lb., or sulphate of ammonia, 100 lb. (*b*) Farmyard manure, 2 tons; superphosphate, 200 lb.; nitrate of soda, 125 lb., or sulphate of ammonia, 100 lb.

Sugar Cane (two dressings): (*a*) Farmed manure, 35 cart loads; superphosphate, 224 lb.; sulphate of potash, 300 lb. (*b*) Good safflower cake, 1,200 lb.; sulphate of ammonia, 375 lb.

Amendments to Indian Explosives Rules

The Burma Government has decided to allow the possession, sale, transport and importation of di-nitro-phenol when packed in watertight packages and mixed with water in the proportion of 85 to 15, and to amend the rules governing the transport and possession of carbide of calcium in order to obtain powers to destroy carbide improperly packed when imported or which becomes wet while in a storage building.

Repatriation of Enemy Aliens

Officially it is expected that the question of the repatriation of Germans and Austrians from India will shortly be considered. The general consensus of opinion seems to be that every German and Austrian at present in India should be repatriated, with exemption only in exceptional cases. In the case of those interned it is considered that they should remain so until their repatriation. In Ceylon legislation is to be introduced excluding all subjects of states which were at war with Great Britain during 1918 for three years.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Liquidators' Notices

BRITISH CHEMICAL PLUMBERS SUPPLY, LTD.—A meeting of creditors was called for Friday, January 30, by the Liquidator, Mr. W. Gamble.

STONEFIELD CHEMICAL CO., LTD.—A general meeting of members will be held at the offices of Messrs. Morris, Gregory, Holmes and Hansford, Chartered Accountants, Parr's Bank Buildings, York Street, Manchester, on Monday, March 1, at 11 a.m. Creditors' claims on or before February 13 to Mr. G. L. Hansford, at the above address.

Company Winding Up Voluntarily

NEW CHEMICAL CO., LTD., The Union Chemical Works, Rusholme, Manchester. Date of Order, January 12.

Notice of Intended Dividend

FORBES, PETER CAMPBELL, Morley, Yorks, Chemist. February 7. Trustee, W. Durrance, Official Receiver, 12, Duke Street, Bradford.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

CALVERT DYES, LTD., MIRFIELD.—Registered January 13, £5,000 debentures; general charge.

LONDON HYGIENIC CHEMICAL CO., LTD., LONDON, S.E.—Registered January 13, mortgage securing all moneys due or to become due, to Barclay's Bank, Ltd.; charged on 181, Gurney Street, Walworth, S.E.; also registered January 13, £3,000 debentures, to said bank by way of collateral security to said mortgage; general charge. *Nil. August 31, 1918.

SHIP CANAL PORTLAND CEMENT MANUFACTURERS, LTD. (formerly STANLOW WORKS ESTATE, LTD.), ELLESMERE PORT.—Registered January 13, £75,000 debentures, to Barclay's Bank, Ltd.; general charge. *£115,000. January 2 1919.

SPRING VALE DYE WORKS, LTD., SHAWCLOUGH MILL, Nr. WATERFOOT.—Registered January 14, £12,000 debentures, to Mather & Platt, Ltd., Manchester; charged on all the specific machinery comprised in agreement of December 31 1919. *Nil. November 18, 1918.

County Court Judgment

NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BARTON (A. T.) & CO., LTD., 74, Stratford Road, Acton, chemists. £15. 13s. 10d. December 16.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116, and 117, Chancery Lane, London, W.C.:—

AMERICAN CHEMICAL & METALLURGICAL CORPORATION, LTD., 441, Salisbury House, E.C.—To win, smelt and refine ore, metal and mineral substances of all kinds. Nominal Capital, £400,000 in 400,000 Ordinary shares of £1 each. Minimum subscription, 7 shares. Directors: A. S. Elmore, Boxmoor, Herts.; F. W. Baker, 10, De Vere Gardens, W.; J. A. Agnew, 13, West Heath Avenue, Hampstead, N.W. Qualification of Directors, 1 share. Remuneration of Directors, £300 each. Chairman £400.

BRECKNELL, TURNER & SONS, LTD.—Saddle soap and skin soap, tallow chandlers, oilmen and lamp manufacturers. Nominal Capital: £10,000 in 10,000 shares of £1 each. Directors: B. B. Turner, 31, Haymarket, S.W.; P. D. Turner; B. G. Davis; J. Watt, 101, Leadenhall Street, E.C.; T. B. Miller, 12, Savile Row, W. 1. Qualification of Directors, £50.

CLARE (T.) & KAVANAGH, LTD., Marlborough Chambers, 6 & 7, Cornmarket Street, Oxford.—Manufacturers of manures, fertilisers and weed destroyers, &c. Nominal Capital: £1,000 in 500 Preference shares of £1, and 500 Ordinary shares of £1. Directors: H. E. Pyle, C. V. Kavanagh. Qualification of Directors, 10 shares.

COOPER (WILLIAM) & NEPHEWS, LTD., 47, Russell Square, W.C. 1.—Chemical manufacturers, chemists, druggists and drysalters. Nominal Capital: £250,000 in 25,000 shares of £10 each. Directors: Sir R. A. Cooper, M.P., 6, Carlton Gardens, S.W. 1; Lady Alice E. Cooper, 6, Carlton Gardens, S.W. 1; R. M. Foot, Whitehill, Berkhamsted, Herts.; C. Timson, Woodside, Ashley Green, Berkhamsted. Qualification of Directors, £1,000. Remuneration of Directors, to be voted by company in general meeting. Sir R. A. Cooper, £2,000.

COTTAM & CO., LTD., 73, Dean Street, Birmingham.—Tallow chandlers, refiners, hide, skin, fat, tallow and wool brokers. Nominal Capital: £4,000 in 4,000 shares of £1 each. Directors: J. T. Cottam, 10, Jesson Road, Walsall; J. T. Woodley, 229, Deakins Road, South Yardley, Birmingham. Qualification of Directors, 1 share.

DENTALITIES, LTD., 355, Oxford Street, W.—Manufacturers of chemical instruments, &c. Nominal capital, £5,000 in 5,000 shares of £1 each. Directors: H. M. Slott, 11, Cotswold Road, Westcliff-on-Sea; W. Land, 42, Marchant Street, Bow, E. Qualification of directors: One share.

DUCKHAM (ALEXANDER) & CO., LTD., Phœnix Wharf, Millwall, E. 14.—To acquire and carry on the business of manufacturers of petroleum products. Nominal Capital: £150,000 in 150,000 shares of £1 each. Directors: A. Duckham, Sir A. Duckham, Violet E. Duckham, P. N. Cooper, R. H. Read, S. Bowrey. Qualification of Directors, £100.

FARM FERTILISERS CO., LTD.—Manufacturers and wholesale and retail vendors of farm fertilisers, artificial manures and kindred products. Nominal Capital, £2,000 in 300 Preference shares of £1 each, and 1,700 Ordinary shares of £1 each. Directors: J. Bromet, Golf Links Farm, Tadcaster (Chairman); J. Illingworth, Manor House, Eccleshill, Bradford. Qualification of Directors, 1 share.

HEADLIVER SALT CO., LTD., The Accounting Offices, Castle Street, Conway, North Wales.—Manufacturers, chemists and druggists. Nominal Capital, £1,500 in 250 Preference shares of £1, and 1,250 Ordinary shares of £1 each. Directors: R. G. Melling, Luriston, Wigan; J. D. Melling, Llys Ifor, Conway, Carnarvon; Winnie L. Melling, Lys Ifor, Conway, Carnarvon; W. Knowley-Redwood, The Cottage, Albert Drive, Conway. Qualification of Directors, £50.

INDUSTRIAL GLASS WORKS, LTD., 3, Howard Street, Strand, W.C. 2.—Manufacturers and dealers in glass and glass articles. Nominal Capital: £25,000 in 22,000 10 per cent. Cumulative Preference shares of £1 each, and 60,000 Ordinary shares of 1s. each. Minimum subscription, £7. Directors: H. Moreland, Stonycroft, Gerrard's Cross, Bucks.; W. Lawson, 35, Argyll Mansions, Chelsea, S.W.; F. R. Bowles, 1, Lower Cross Road, Hampstead, N.W.; and three others. Qualification of Directors, £100. Remuneration of Directors, £150 each.

MAYMORN CHEMICAL COMPANY, LTD., 22, Lace Street, Liverpool.—To acquire and carry on the business of soap manufacturers, &c., carried on by Eric B. Higgins. Nominal capital, £1,000 in 1,000 shares of £1 each. Directors: John Smith Hatfield, 33, St. George's Court, Gloucester Wood, London; Eric B. Higgins, 12, Elleroy Park Road, Wallasey.

MICA & ASBESTOS INSULATING CO., LTD.—Manufacturers of mica, asbestos carta insulating cast enamelled wire, and other insulating or insulated material. Nominal Capital, £10,000 in 10,000 shares of £1 each. Directors to be appointed by subscribers. Qualification of Directors, 1 share. Subscribers H. Barrett, 2 & 3, West Street, Finsbury Circus, E.C.; J. Fogg, 69, Knatchbull Road, Camberwell, S.E.

MIDLAND COUNTIES GLUE CO., LTD., Lower Mounts, Northampton.—Manufacturers of gelatine, glue, size, tallow, manure and grease boilers. Nominal Capital: £30,000 in 30,000 shares of £1 each. Directors: J. Pebody, Rosemount, Queen's Park Parade, Northampton; W. P. Cross, Oak Lodge, Duston, Northampton; S. F. Smith, Barnfield, Dallington, Northampton; and three others. Qualification of Directors, £500.

PRESTON, HULL & CO., LTD., Holborn House, 112, High Holborn, W.C.—Chemists, druggists, drysalters, oil and colourmen. Nominal Capital: £12,500 in 10,000 Participating Preference shares of £1 each, and 10,000 Ordinary shares of 5s. each. Directors: C. P. Preston, The Moorings, Broom Water West, Teddington; W. R. Preston, 10, Riverside Gardens, Twickenham Park, Middlesex; C. J. L. Hull, Earlswood Mount, Redhill, Surrey. Qualification of Directors, £500. Remuneration of Directors, £50 each.

ROCK & BREAKSPEAR, LTD., 38, King Street, Maidenhead, Berks.—Chemists and druggists, &c. Nominal Capital, £12,000 in 2,000 Preference shares, and 10,000 Ordinary shares of £1 each. Directors to be appointed by subscribers. Qualification of Directors, £100. Remuneration of Directors, £1,000, to be divided.

ROCKWARE GLASS SYNDICATE, LTD., 142, Audry House, Ely Place, E.C.—Manufacturers of all kinds of glassware. Nominal Capital, £150,000 in 150,000 shares of £1 each. Directors: T. M. McAlpine, J.P., Fairmile Court, Cobham, Surrey; W. A. Bailey, J.P., 38, Princes Gate, S.W.; C. H. Pleant, 22, Whitehall Road, Harrow-on-the-Hill; L. Abrahams, Audry House, Ely Place, E.C. Qualification of Directors, £500. Remuneration of Directors, £200 each.

SAVAGE, HERBERT & CO., LTD., 84, Chancery Lane, W.C. Manufacturers and dealers in essential oils, scent and perfumes. Nominal Capital, £5,000 in 4,900 Preference shares of £1 each, and 2,000 Ordinary shares of 1s. each. Directors: Herbert Savage, A.I.C., F.C.S., 84/86, Chancery Lane, W.C.; R. E. Norton, 82, West Road, Crouch End, N.

STEINBERG, N., LTD., 19 & 20, Dufferm Street, Bunhill Row, E.C. Drysalter. Nominal Capital, £15,000 in 15,000 Ordinary shares of £1 each. Director: N. Steinberg, Chairman. Qualification of Directors, 1 share. Remuneration of Directors, £100, Chairman.

THYLENE, LTD., 35, Commercial Street, Halifax, York.—Manufacturers and dealers in "Thylene," wholesale and manufacturing chemists and druggists. Nominal Capital, £2,000 in 2,000 £1 shares. Directors: N. B. Fielden, Rose Cottage, Ogden, near Halifax; O. Walker, Upper Brookholes, Ogden, near Halifax; J. H. Hicken, Upper Brookholes, Ogden, near Halifax (First Directors). Qualification of Directors, £100; First Directors, 300 Ordinary shares.

TUNNEL GLASS & BOTTLE WORKS, LTD.—Manufacturers of glass bottles and of every kind of glassware. Nominal capital: £10,000 in 10,000 shares of £1 each. Directors to be appointed by subscribers. Remuneration of Directors to be voted by company in general meeting. Subscribers: F. A. S. Gwatkin, 31-34, Basinghall Street, E.C. 2; S. Cronin, 31-34, Basinghall Street, E.C. 2.

TURNER DRUG & GALENICAL COMPANY, LTD.—Manufacturing and analytical chemists, &c. Nominal capital, £20,000 in 20,000 shares of £1 each. Directors: E. A. Wilson, Holmleigh, Woodcote Green, Wallington, Surrey; A. Barket, Thorpe House, Thorpe Bay, Essex (both permanent directors). Qualification of directors: 200 ordinary shares; permanent directors, 2,000 ordinary shares.

VERNON LABORATORIES, LTD., "Vernon House," 45 & 46, Lower Marsh, Waterloo Road, Lambeth, S.E. Manufacturers of medicines and medical and toilet preparations and drugs. Nominal Capital, £5,000 in 1,000 Preference shares, and 4,000 Ordinary shares of £1 each. Directors: S. V. L. Harford, 36, The Galatinate, New Kent Road, S.E.; A. E. White, 18, Heathfield Road, Bexley Heath; Isabel M. St. Leger, Keneally, 59, Earl's Court Square, S.W.5. Qualification of Directors, £250. Remuneration of Directors, £50 each.

VICI MANUFACTURING CO., LTD., Blockley Court, Blockley, Worcester.—Soap manufacturers, chemists and druggists. Nominal Capital: £5,000 in 5,000 shares of £1 each. Directors: G. Blake, Redcourt, Cassiobury, Park Avenue, Watford.

WADE J. LOFTHOUSE & CO., LTD., The Walatan Leather Works, Long Eaton, Birmingham.—To carry on the business of hide and leather merchants and leather manufacturers. Nominal Capital, £30,000 in 3,000 Cumulative Participating Preference shares of £5 each and 15,000 Ordinary shares of £1 each. Directors: J. W. Lofthouse, The Hermitage, Wymeswold, Nottingham; J. P. Clon, Kenwood, Bower Road, Hale; C. G. Barradale, Summerhill, Moorland Avenue, Leicester.

WHARF LANE CONCRETE CO., LTD., Silver Street, Ilminster, Somerset.—Concrete manufacturers. Nominal Capital, £15,000 in 15,000 shares of £1 each. Directors: W. S. Growtage, 18, Church Street, Bridgwater; W. A. Hutchings, Silver Street, Ilminster; I. J. Morgan, Townsend, Ilminster. Qualification of Directors, 1 share.

WOOLFORD'S COMPTOIR GEOLOGIQUE, LTD., 22 & 23, Lawrence Pountney Lane, Cannon Street, E.C.4.—To carry on the production of metallic colours and pigments by a secret process from silver ore. Nominal Capital, £2,000 in 20,000 Preference shares of 1s. each. Directors: James Woolford, Joseph Woolford. Qualification of Directors, 40 shares.

For Sale or Wanted

(Three lines, 3s.; each additional line, 1s.)

SALE.—Offers invited, Journal of the Institute of Metals, 12 Vols., 1913 to 1919.—Apply Box 51, CHEMICAL AGE Offices, 8, Bouverie St., E.C.4.

SPECTROSCOPES, MICROSCOPES, bought, sold, and exchanged. List free.—JOHN BROWNING, 146, Strand, W.C.

WANTED.—LEAD, remelted in pigs or ingots. Also Lead Ashes, Slags, and Skimmings. Prompt cash terms.—SPOONER, SON & CO., 214, Bishopsgate, London, E.C.2. Telephone: London Wall 5959. Telegrams: "Spooneral, London."